Mitchell Unit 1
Turbine – Generator Outage
Fall 2001

Report Prepared by
John Lackner
RSO Turbine Coordinator

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Summary

The turbine outage for Mitchell unit 1 started on 9/4/01 and maintenance release was on 11/4/01. During start-up, the controls and turbine vibration were trouble shot and full load was achieved on 11/20/01.

The turbine work was done by RSO personnel work around the clock on a 3 shift basis for the majority of the outage. Manpower consisted of a mix between turbine mechanics and B mechanics, varying between 15 and 20 men per shift during the outage. During start-up, RSO crews provided 3 men per shift as support only.

The outage consisted of major turbine outages for the HP turbine, LP "A" turbine, the generator, the BFP and BFP turbine. Plus the exciter was upgraded to a static exciter system and the turbine controls and instrumentation were upgraded.

A brief summary of the work completed during the outage is as follows:

HP Turbine
- Replaced the running HP rotor with a spare rotor.
- Replaced the HP nozzle with a new nozzle.
- Inspected and repaired all of the HP blade rings.
- Changed out all of the spill strips and packing in the HP turbine.
- Replaced all of the bell seals with new seals.
- Completed magnetic rubber inspection of the HP steam inlet snouts.
- Replaced all of the HP seal rings with new seal rings.
- Inspected the thrust bearing.

LP "A" Turbine
- Replaced the running LP A rotor with a spare LP rotor
- Changed out all of the packing and spill strips in the LP A turbine
- Modified the crossover gaskets for a flexitallic gasket
- Modified the LP cone extensions for future NDE inspections
- Changed the LP A exhaust hood expansion joints

Generator and Exciter
- Replaced the running generator field with a spare field.
- CMS rewedged the generator.
- The generator core bolts were retorqued.
- The hydrogen seal rings were rebabbitted.
- The exciter was removed and replaced with a collector ring skid as part of the static exciter upgrade. This required a large piping modification.

Valves and Other Work Completed
- Inspected and repaired all 11 main turbine bearings.
- Inspected all turbine oil deflectors and repaired as necessary.
- The old control system was removed and replaced with a trip block system.
- The main shaft oil pump was inspected and the shaft sleeve and impeller were replaced.

- All of the old vibration detectors and other supervisory equipment were replaced with new Bentley Nevada equipment.
- The throttle valves were inspected and routine repairs were completed.
- The governor valves were inspected and routine repairs were completed.
- All 8 governor valve seats were weld repaired and machined by Westinghouse.
- The throttle valves were inspected and routine repairs were completed.
- The interceptor valves were inspected and routine repairs were completed.
- The reheat stop valves were inspected and routine repairs were completed.
- Routing cleaning and inspections were done on the turning gear oil pumps, and the lube oil coolers.
- Routing cleaning and inspections were done on the hydrogen coolers, seal oil coolers, and stator water coolers.
- A turbo-toc filtering system was added to the lube oil system.

BFP and BFP turbine

- The boiler feed pump turbine rotor was replaced with a spare rotor.
- The boiler feed pump rotor was replaced with a spare element.
- The gasket fit on the BFP was weld repaired and machined.
- The BFP control valves and stop valves were inspected and routine repairs were completed.
- The valve seat for the right side pump end BFP control valve was replaced.

The start-up of the turbine was extended due to numerous problems, including balance problems, controls trouble shooting, repairs to the bearing lift pump, hydrogen seal rubbing, and a stator water system leak. The work done during start-up is broken out into three generator addendum sections for this report.

Outage Key Personnel

Mitchell Plant

Chuck George	Unit 1 outage manager
Russ Gwin	Process owner
Jack Huggins	Turbines
Roger Clark	Generator / Exciter
Frank Lallone	2nd shift / parts

AEP - RSO

John Lackner	1st shift turbine-generator coordinator
Doug Fox	2nd shift turbine-generator coordinator
Dave Howell	Supervisor
Ron Kline	Supervisor
Don Eikenberry	Supervisor

AEP Engineering

Jim Cable	Turbine engineer
Dan Shriver	Generator engineer
Ed Wingard	Static exciter

AEP – CMS (on site)

Steve Burford	Boiler feed pump rebuild

Siemens - Westinghouse

Ed Chik	1st shift field engineer
Leo Wu	2nd shift field engineer
Dennis Handley	Start-up & balancing

Recommendations

1) When inspecting the reheat stop valves, it was noted that three of the second reheat stop valves had excessive runout in the valve shaft. Not enough spare shafts were available to replace these shafts, and the lead-time for obtaining new shafts went beyond the scheduled outage time frame.

   During the next valve outage, the shafts for the TE – left, GE – left, and GE – right valves should be replaced. New shaft keys should also be used during this replacement.

2) When inspecting the intercept valves, the retaining nuts from the stem to the disk had to be destroyed to facilitate disassembly. Because only four retainers were available, we decided to not remove the stem from the disk on the TE – left and TE – right 2nd reheat IV's.

   During the next valve outage, enough retainers should be available to allow the stems to be removed from the disks on all of the intercept valves.

3) When inspecting the intercept valves, it was noted that all of the second reheat IV's had excessive runout in the valve stem. No spare stems were available for the second reheat IV's, and the lead-time for obtaining new shafts went beyond the scheduled outage time frame.

   During the next valve outage, new stems should be available for all of the 2nd reheat IV's.

4) A visual inspection of the old nozzle revealed that just about all of the blading had been eroded away. Jim Cable of turbine engineering performed further investigation of the nozzle after it had been removed from the inner shell at CMS. Mr.Cable recommended that a new nozzle be purchased for use prior to the next outage rather than repairing the old nozzle. His recommendation was based on the embrittlement of the blading and number of previous repairs to the nozzle.

5) When replacing the hydrogen seals, a set of steel backed babbitted rings were sent to RPM to be properly sized for use to replace the existing seal rings. When we went to install the steel backed ring, the Westinghouse rep and Jim Cable of Turbine engineering both objected to the use of steel backed rings. A bronze backed seal ring was repaired and used rather than the steel backed ring.

   All steel backed hydrogen seal rings for unit 1 need to be discarded so that this problem is not seen again. Spare hydrogen seal rings should be of the bronze seal ring style.

6) During the start-up, a leak was noted in the generator cooling water system, specifically in the equalizing line that runs inside the top of the generator frame. The equalizing line had been rubbing against the struts in the generator frame. This equalizing line has caused leaks in the stator water system at previous outages as well.

   The equalizing line should be replaced in its entirety during the next generator outage. Note that this can be done during an "in place" field inspection.

7) During the start-up, one of the feed lines for the old exciter hydrogen seal oil did not get blanked as it should have. This feed is currently valved out, but should be blanked at the next opportunity.

8) The new eccentricity pickup for the BFP turbine is currently reading on a nut on the front end of the shaft. This nut has about 3 mils of runout in it, so the eccentricity reading is not accurate.

   During the next outage, either the eccentricity probe should be moved to a different position on the shaft with no runout, or the nut where the eccentricity pick-up reads should be ground while on turning gear to remove all of the runout.

9) During the start-up, the BFP turbine locked up numerous times when trying to be put on turning gear. It is possible that the clutch for the BFPT turning gear needs to be replaced.

10) During this outage, the lube oil cooler tubes were cleaned out in place. During the next outage, the tube sheets should be removed from the coolers and steam cleaned to keep them from being fouled up.

11) During this outage, a drainage gutter was added to the lube oil tank for the purpose of catching any oil mist accumulation. During the next outage, a filter type demister system should be used to replace the vapor extractor for the oil system. The demister system will reclaim the oil mist through a filter and return it to the oil tank. This type of system is commercially available and is already in service on some of the other AEP turbine oil systems.

HP Turbine

Rotor

Opening clearances and position checks were taken on the running HP rotor, S/N TD44466 and then the rotor was removed. This rotor was loaded onto a shipping skid and was sent to CMS for future repairs.

The spare rotor, S/N TD35049, was installed and compatibility clearances were taken on the rotor. All clearances between the new rotor and old blade rings were acceptable with the exception of 2 rows of packing, where the high teeth needed to be moved axially. See section on packing.

The rabbet fit for the couplings to the control rotor and IP rotor and spacer were measured and had proper interference. All of the coupling bolts for "A" coupling were inspected and miced for clearance.

The position on the HP rotor where Bentley Nevada personnel were to mount the vibration indicators for T-2 journal had a large ding on it. This position was between the T-2 journal and the thrust runner on a normally non-critical surface. The balance machine was brought to site from CMS and was used as a lathe for the CMS machinists to clean up the rotor at this position.

After all of the blade rings were installed and aligned, the rotor was reinstalled. Closing clearances were taken. The rotor had to be removed so that a chamfer could be machined on an edge of the nozzle. The rotor was also shifted off of the design "K" reading to a final K = 0.125". The rotor turned freely at this position and had acceptable float in both directions. The thrust bearing was built with the rotor at the new "K" position.

The axial positions of the HP and IP rotor showed that the old coupling spacer could be reused without compromising any clearances. The HP rotor was moved to align "A" coupling, and the outer shell was moved to maintain rotor clearances. See section on alignment.

Control Rotor

The control rotor was removed from the HP rotor and was sent to CMS for inspection and repairs. The shaft oil pump impeller was removed from the control rotor. A spare impeller and locking sleeve were installed on the control rotor. New seal rings were machined for the main oil pump.

The control rotor was reinstalled on the HP rotor. All bolting was torqued and a sling check was done. The runout on the sleeve and impeller were within limits, but the eccentricity ring would not run true with the control rotor. The eccentricity ring was unbolted and removed, and then machined to correct the runout.

Nozzle and Blade Rings

The upper inner shell was unbolted and removed. The nozzle was visually inspected in place. The blading on the nozzle was almost completely eroded away. The upper inner shell was then sent to CMS. The upper blade rings, dummy rings, and gland casings were unbolted and removed. A large number of nuts had to be damaged to facilitate disassembly.

After the rotor was removed, all of the lower blade rings and dummy rings were removed. The lower inner shell was also removed.

Both halves of the inner shell, with the nozzle still installed in it, were sent to CMS. The old nozzle had almost complete erosion of the blading. At CMS, the nozzle was removed and a new nozzle was installed. The new nozzle was positioned axially based on opening rotor clearances. All nozzle bolting was pinned per Westinghouse procedure. The new nozzle also included new radial seals.

It was the recommendation of Jim Cable (Turbine Engineering) that the nozzle that was removed should be scrapped and a new nozzle be purchased as the new spare.

After installing the rotor, it was noted that the tennons of the Curtis wheel had too tight of a clearance with a lip on the nozzle. The rotor was removed and the nozzle was hand ground to chamfer the nozzle at the point of the tightest clearance. A drawing is attached to this section detailing the corner that had to be removed.

The HP and VHP blade rings were shipped to CMS (both upper and lower halves). They were blast cleaned, NDE inspected and minor partition weld repairs were made. The seal strips were all replaced with new strips provided by STAR.

The upper half of the LP dummy ring had stripped out threads in the eye bolt hole. The upper half of the LP dummy ring was sent to CMS where the eye bolt hole was repaired.

The VHP dummy ring, HP dummy ring, lower LP dummy ring and all gland casings were kept on site. The packing was removed from all dummy rings and casings. The casings were all oxide blasted by Federal Industrial and NDE inspected by CMS personnel. All of the packing was replaced with new packing provided by STAR. The HP dummy ring was inspected for out of round in both the bolted and unbolted condition. The HP dummy ring appears to spring when it is unbolted.

The inner shell and all lower blade rings and dummy rings were returned to site and installed. The nozzle plate, blade rings and dummy rings were all aligned to a tightwire, see section on alignment. The side slip of all blade rings and dummy rings was checked and corrected where necessary. All of the blade ring support keys were checked for clearance with respect to the upper half blade rings and upper inner shell.

After the rotor was installed, the upper blade rings and dummy rings were installed. New nuts were used on virtually all of the blade ring bolting. All blade ring bolting was torqued to Westinghouse design specifications.

Packing and Sealing Strips

The packing and sealing strips were all replaced with new packing and seals provided by STAR. Prior to the outage, personnel from STAR arrived on site and took measurements on the HP rotor in order to calculate the desired tooth height of the new packing and seal strips. After all of the opening clearances were completed, the old packing was removed from their blade rings, dummy rings, and gland seals. Some packing was shipped to STAR as samples for rows of packing that they did not recognize the part number on.

STAR was also requested to make an axial move of the high teeth on two rows of packing. The teeth for the packing for the HP dummy ring were moved axially by 0.025" towards the governor, and the teeth for the packing in row 7 (HP blade ring) were moved axially by 0.100" towards the generator. Closing clearances showed that these moves were not done properly, but rather than accepting the delay in sending the packing back to STAR, we chose to move the rotor towards the generator off of the "K" position.

The packing butts were cut by STAR personnel on site. All closing clearances are included with this report.

Bell Seals and Inlet Seal Rings

After the lower inner shell had been removed, it was noted that the retaining nut for the bell seal on the right hand side (#B-1) was rotating freely. The threads in the steam inlet pipe for this seal had been completely eroded/stripped free. The threads on the retaining nut were also badly damaged.

The other seven bell seals were miced. CMS miced up the fits in the inner shell at the shop using a Boise gauge. All seven bell seals had excessive clearance. RSO personnel removed the bell seal and all retainers.

CMS personnel weld repaired the eroded threads and tapped new threads into the inlet pipe. The retaining nuts were installed without the bell seals and the axial gaps were checked. The spare bell seals were machined to the correct OD and were trimmed to provide for the correct axial clearance.

The bell seals were installed on site by RSO personnel. The locking pins were drilled and installed by CMS personnel.

The first reheat inlet seal rings and the HP exhaust seal rings are piston type rings. The rings were checked for axial clearance using feeler gauges. All of the HP exhaust seal rings were suitable for reuse, but all of the 1st reheat inlet rings had excessive axial clearance. New rings were ordered from Schmitt Industries. The new rings had extra stock on them and were fit on site by RSO personnel.

Inner Shell

As discussed above, the upper and lower inner shells were sent to CMS. At CMS, the shells were blast cleaned and NDE inspected. Minor crack repairs were made to the inner shell. The seal ring fits were cleaned and miced for the bell seal replacement.

A guide ring was welded into the inner shell for the fits to the reheat steam inlet. This guide ring was to be used in compressing the piston style reheat inlet rings. This guide did not work properly when setting the lower inner shell and was cut out of the inner shell steam inlet.

The lower inner shell was installed and aligned to a tightwire. The side movement of the shell was closed up by welding up the slot. See section on alignment.

After the inner shell was installed, the bolts were impacted. One of the studs turned freely as if the threads were pulled so the upper half inner shell was removed. Stud #75 (body bound) was cracked completely through. It appeared to have been cracked for a long period of time. The RSO mechanics were able to back the cracked portion of the stud out of the bolt hole. A new stud was in stock and was installed.

Since CMS was on site, the rest of the inner shell studs were checked for cracks a second time. Stud #54 on the right side turned out to be cracked too. This stud had also been cracked for a long period of time, but this stud had to be drilled out. CMS machinists removed the stud. No spare stud was available, but a larger stud was in stock. This stud was shipped to Schmitt Industries and turned down to the proper size.

After the inner shell was reinstalled, all bolting was stretched to OEM specifications.

Outer Shell

The upper and lower outer shells were blast cleaned on site by Federal Industrial Services and NDE inspected by CMS personnel. A magnetic rubber inspection was done on the steam inlet sleeve trepan areas by Wesdyne Services. All trepan areas were free of indications. The bell seal work done is described above.

One thermo well in the lower outer shell was bent over when installing the lower inner shell. It was bent back into shape with no damage done. The drain line for the lower shell had to be cut in order to remove the inner shell, and it was welded back into place during reassembly.

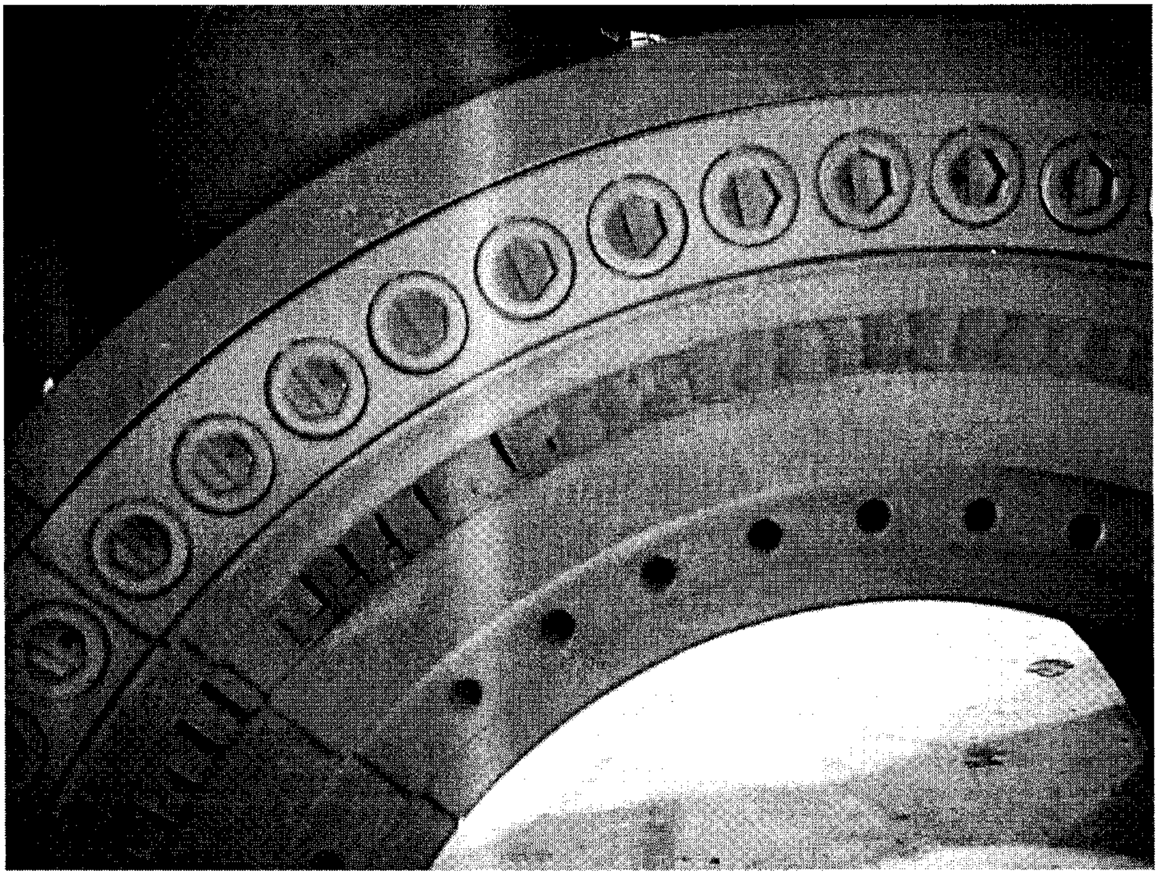
All of the shell bolting was blast cleaned and NDE inspected. All of the bolting for the main steam inlet flanges and reheat steam inlet flanges was blast cleaned and NDE inspected. 7 bolts for these flanges were replaced. All of the bolting for the main steam exhaust flange had to be replaced.

After the shell was assembled, all shell bolting was stretched to Westinghouse desired stretch using induction heating by Mannings. All steam inlet bolting was cold stretched using the Plarad torque wrench and the plants Hy-torc wrenches.

The outer gland seals were unbolted and pulled back to allow the metal gaskets to be changed out. The old gaskets were moderately eroded.

Mitchell Unit 1 - HP Turbine

Fall 2001 Outage

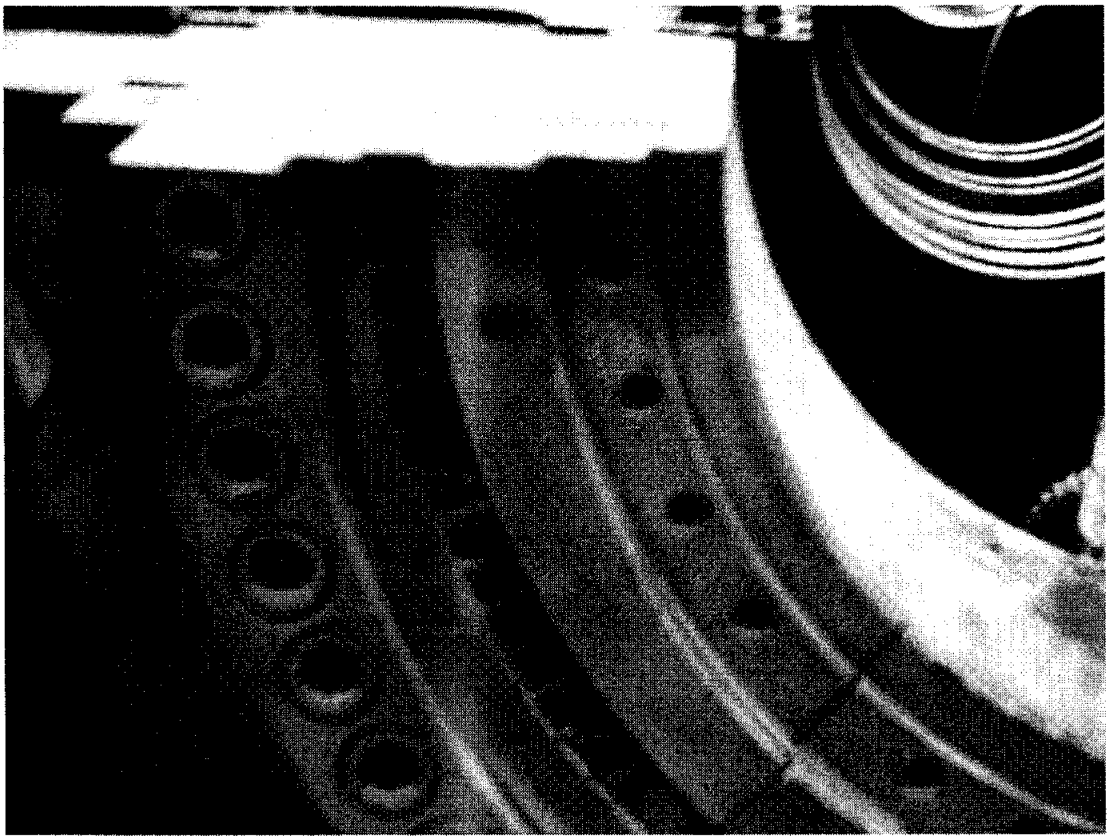


Comments:

This photo shows the HP nozzle as found. The nozzle was replaced with a spare nozzle.

Mitchell Unit 1 – HP Turbine

Fall 2001 Outage

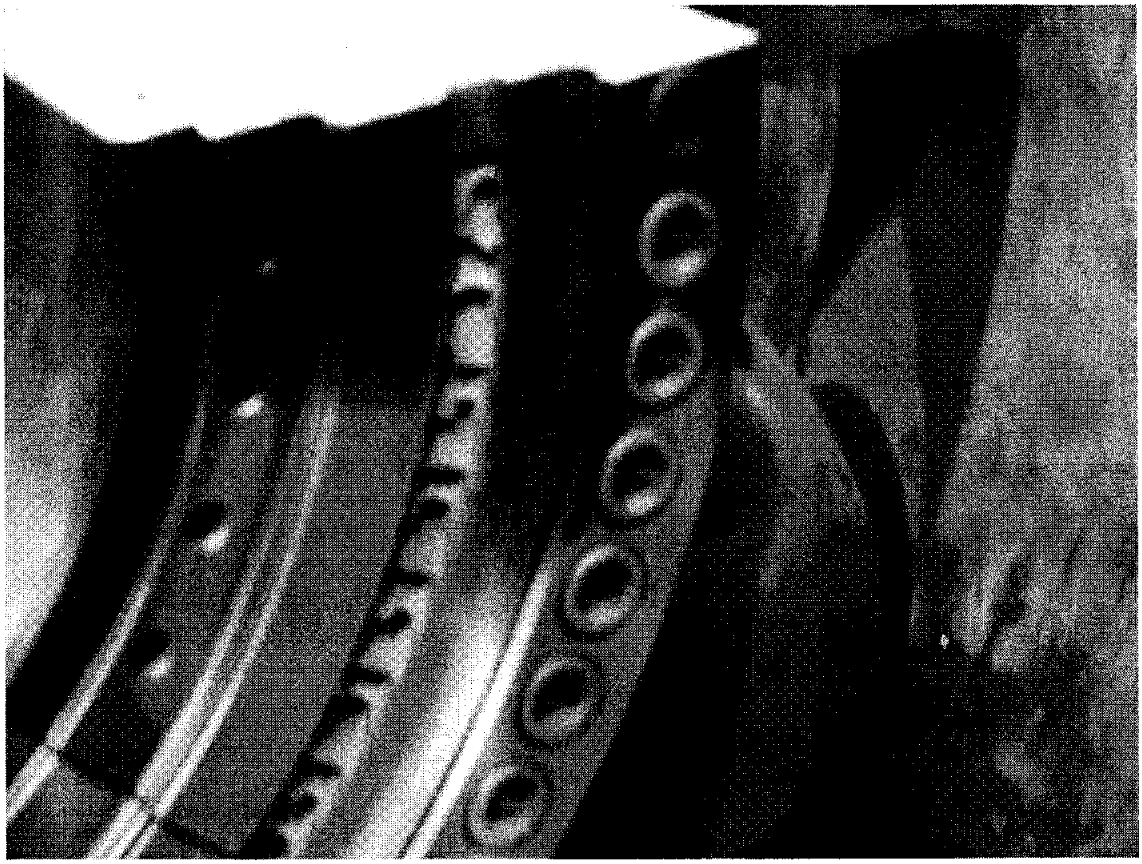


Comments:

This is another photo showing the nozzle in an as-found condition. Note the heavy damage to the blading. A new nozzle was installed in the turbine.

Mitchell Unit 1 – HP Turbine

Fall 2001 Outage

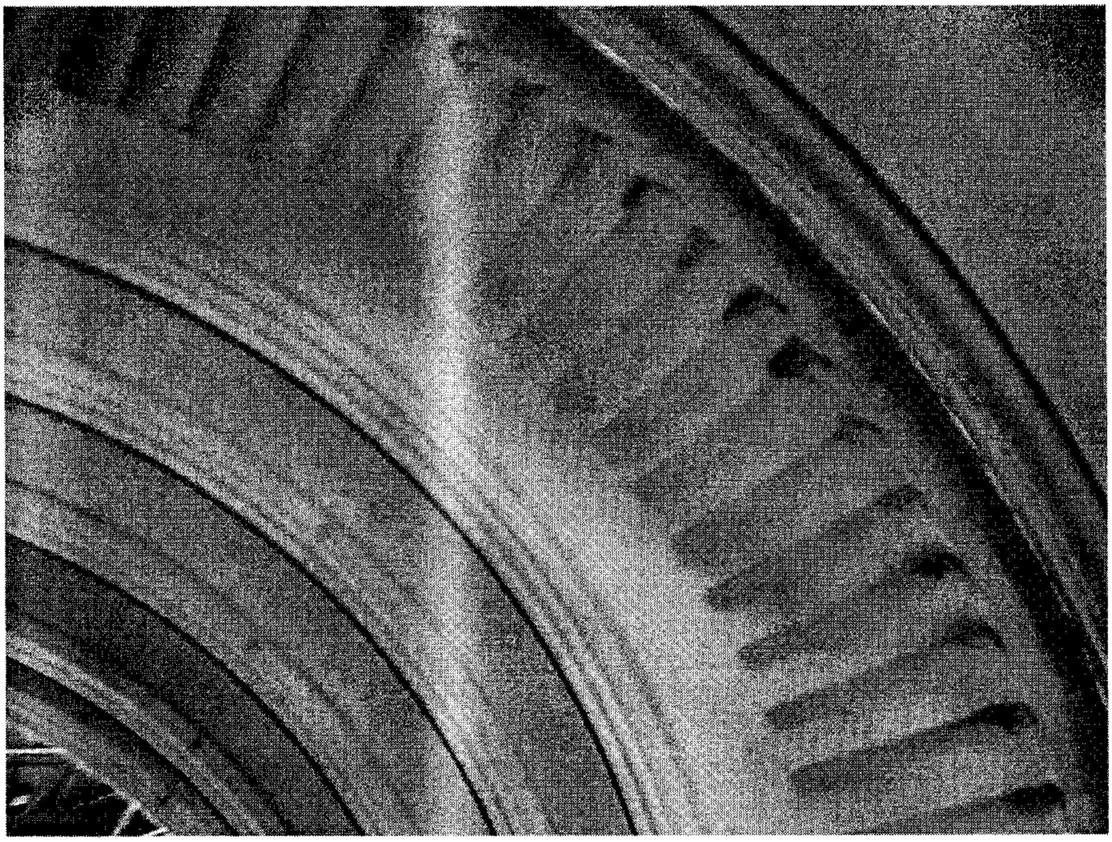


Comments:

This is another photo showing the nozzle in an as-found condition. Note the heavy damage to the blading. A new nozzle was installed in the turbine.

Mitchell Unit 1 – HP Turbine

Fall 2001 Outage



Comments:

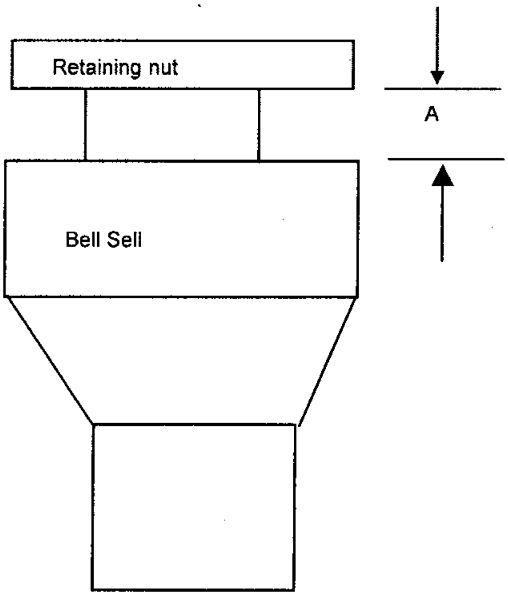
This photo shows the HP blade ring in an as found condition. Note the erosion of the blading. All repairs were completed by CMS.

**SIEMENS
WESTINGHOUSE**

CUSTOMER: AEP
LOCATION/UNIT #: MITCHELL 1

BELL SEAL AXIAL DIMENSION

BB/FRAME: JOB NO.:
COMPONENT/S.O.: DWG.:



	A - 0 POSITION	A - 90 POSITION	A - 180 POSITION	A - 270 POSITION
B-1	0.860	0.860	0.860	0.861
B-2	0.907	0.908	0.908	0.908
B-3	0.881	0.882	0.884	0.884
B-4	0.868	0.869	0.869	0.869
C-1	0.852	0.852	0.852	0.853
C-2	0.877	0.879	0.878	0.879
C-3	0.883	0.884	0.885	0.883
C-4	0.869	0.868	0.868	0.871

FILE: F46584.PPT Rev. 01
Use With: F43740A.PPT

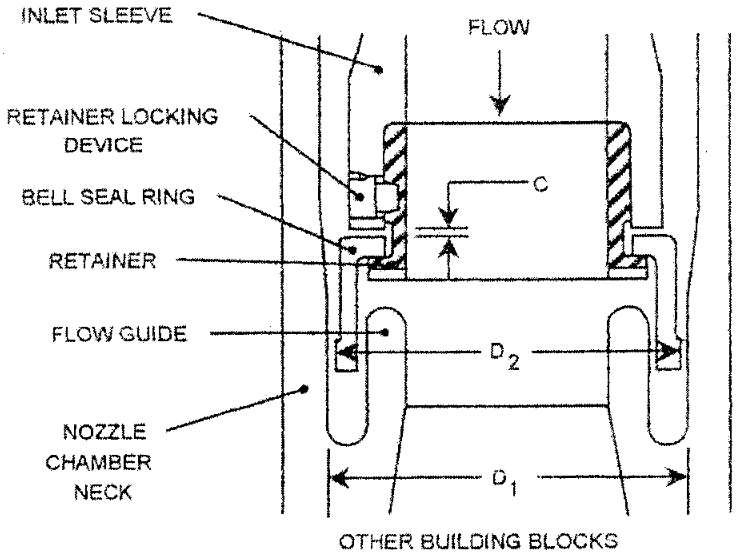
Tool # Used ____________ Cal. Due Date ________

As Found ________ Reading Taken By: ________B. Haglock ____________ Date: _10/03/01____

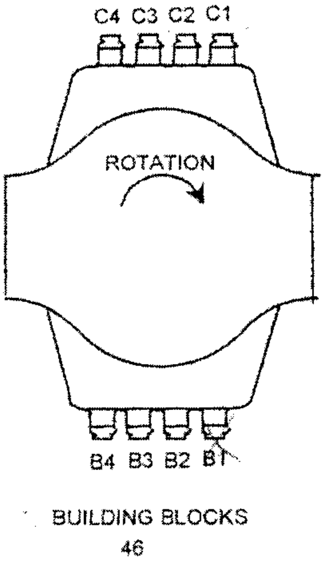
As Assembled ____X______ Reviewed By (W) Eng.: ____________ Date: ________

Bell Seal Instruction Sheet

Date: ____________ Turbine Serial No. ____________ Prepared By ____________________



CROSS SECTION THROUGH INLET SEAL



INLET IDENTIFICATION. VIEW FROM GOVERNOR END

**SIEMENS
WESTINGHOUSE**

CUSTOMER: AEP
LOCATION/UNIT #: MITCHELL 1

BELL SEAL INSPECTION REPORT

BB/FRAME: JOB NO.:
COMPONENT/S.O.: DWG.:

			CYLINDER COVER			
STEAM INLETS		NOTE	C4 (LS)	C3	C2	C1 (RS)
NOZZLE CHAMBER NECK BORE AT BELL SEAL, D_1	PARALLEL TO TURBINE SHAFT (AXIAL)	1	8.453	8.465	8.437	8.454
	PERPENDICULAR TO TURBINE SHAFT (TRANSVERSE)	2	8.452	8.465	8.439	8.453
	AVERAGE	3	8.4525	8.465	8.438	8.4535
BELL SEAL RING O.D. D_2	ANY ORIENTATION	4	8.450	8.464	8.437	8.451
	90° APART	5	8.450	8.463	8.437	8.451
	AVERAGE	6	8.450	8.464	8.437	8.451
DIAMETRICAL CLEARANCE, $D_1 - D_2$		7	0.0025	0.0015	0.001	0.002
AXIAL CLEARANCE, C			.002-.004	.003-.006	.003-.006	.004-.005

NOTE: 3 = 1 + 2 / 2
6 = 4 + 5 / 2
7 = 3 - 6
ALL DIMENSIONS ARE IN INCHES

Design : diametrical clearance .002-.004, axial clearance .003-.005

			CYLINDER BASE			
STEAM INLETS		NOTE	B4 (LS)	B3	B2	B1 (RS)
NOZZLE CHAMBER NECK BORE AT BELL SEAL, D_1	PARALLEL TO TURBINE SHAFT (AXIAL)	1	8.433	8.418	8.422	8.419
	PERPENDICULAR TO TURBINE SHAFT (TRANSVERSE)	2	8.433	8.419	8.424	8.422
	AVERAGE	3	8.433	8.4185	8.423	8.4205
BELL SEAL RING O.D. D_2	ANY ORIENTATION	4	8.430	8.416	8.421	8.419
	90° APART	5	8.431	8.415	8.421	8.418
	AVERAGE	6	8.4305	8.4155	8.421	8.4185
DIAMETRICAL CLEARANCE, $D_1 - D_2$		7	0.0025	0.003	0.002	0.002
AXIAL CLEARANCE, C			.002-.004	.002-.005	.003-.005	.004-.005

Recommend to replace all bell seals

Tool # Used ____________________ Cal. Due Date __________

As Found __________ Reading Taken By: ___CMS & Site Shift______________ Date: _10/03/01___

As Assembled _____X_____ Reviewed By (W) Eng.: ____________________ Date: __________

FILE: F46584.PPT Rev. 01
Use With: F43740A.PPT

**SIEMENS
WESTINGHOUSE**

CUSTOMER: AEP
LOCATION/UNIT #: MITCHELL 1

BELL SEAL INSPECTION REPORT

BB/FRAME: JOB NO.:
COMPONENT/S.O.: DWG.:

INSPECTION WAS SCHEDULED.

			CYLINDER COVER			
STEAM INLETS		NOTE	C4 (LS)	C3	C2	C1 (RS)
NOZZLE CHAMBER NECK BORE AT BELL SEAL, D_1	PARALLEL TO TURBINE SHAFT (AXIAL)	1	8.453	8.465	8.437	8.454
	PERPENDICULAR TO TURBINE SHAFT (TRANSVERSE)	2	8.452	8.465	8.439	8.453
	AVERAGE	3	8.4525	8.465	8.438	8.4535
BELL SEAL RING O.D. D_2	ANY ORIENTATION	4	8.440	8.450	8.427	8.443
	90° APART	5	8.440	8.450	8.425	8.442
	AVERAGE	6	8.440	8.450	8.426	8.443
DIAMETRICAL CLEARANCE, $D_1 - D_2$		7	0.0125	0.015	0.012	0.011
AXIAL CLEARANCE, C			.004-.007	.000-.003	Tight	.000-.002

NOTE: 3 = 1 + 2 / 2
6 = 4 + 5 / 2
7 = 3 - 6
ALL DIMENSIONS ARE IN INCHES

Design : diametrical clearance .002-.004, axial clearance .003-.005

			CYLINDER BASE			
STEAM INLETS		NOTE	B4 (LS)	B3	B2	B1 (RS)
NOZZLE CHAMBER NECK BORE AT BELL SEAL, D_1	PARALLEL TO TURBINE SHAFT (AXIAL)	1	8.433	8.418	8.422	8.419
	PERPENDICULAR TO TURBINE SHAFT (TRANSVERSE)	2	8.433	8.419	8.424	8.422
	AVERAGE	3	8.433	8.4185	8.423	8.4205
BELL SEAL RING O.D. D_2	ANY ORIENTATION	4	8.423	8.408	8.401	Broken
	90° APART	5	8.423	8.408	8.403	
	AVERAGE	6	8.423	8.408	8.402	
DIAMETRICAL CLEARANCE, $D_1 - D_2$		7	0.01	0.0105	0.021	
AXIAL CLEARANCE, C			0.002	0.002	0.001	

Recommend to replace all bell seals

Tool # Used ______________________________ Cal. Due Date __________

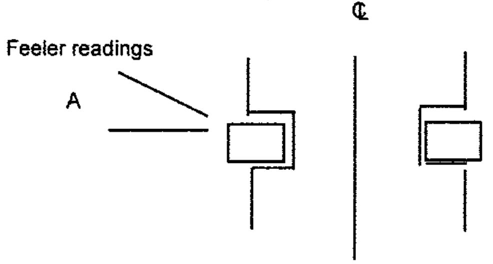
As Found ____X______ Reading Taken By: ___CMS & Site Shift______________ Date: _9/19/01___

As Assembled __________ Reviewed By (W) Eng.: ____________________________ Date: __________

FILE: F46584.PPT Rev. 01
Use With: F43740A.PPT

SIEMENS
WESTINGHOUSE

CUSTOMER: AEP
LOCATION/UNIT #: MITCHELL # 1
HP first reheat inlet & HP steam exhaust seal ring
BB/FRAME: JOB NO.:
COMPONENT/S.O.: DWG.:



Seal ring location	A at 0	A at 90	A at 180	A at 270
HP steam exhaust	locate at outer cylinder cover			
LS 1	0.004	0.004	0.005	0.006
LS 2	0.007	0.006	0.007	0.007
LS 3	0.005	0.004	0.004	0.004
RS 1	0.006	0.007	0.006	0.004
RS 2	0.004	0.005	0.007	0.006
RS 3	0.005	0.005	0.005	0.005
HP steam inlet	locate at outer cylinder cover			
LS 1	0.02	0.013	0.015	0.032
LS 2	0.023	0.02	0.027	0.034
LS 3	0.014	0.015	0.017	0.014
RS 1	0.014	0.018	0.017	0.018
RS 2	0.023	0.032	0.030	0.032
RS 3	0.035	0.032	0.022	0.025
HP steam inlet	locate at outer cylinder base			
LS 1	0.032	0.024	0.021	0.029
LS 2	0.021	0.017	0.020	0.025
LS 3	0.04	0.027	0.026	0.038
RS 1	0.02	0.012	0.02	0.015
RS 2	0.025	0.025	0.025	0.035
RS 3	0.042	0.025	0.033	0.033

Design axial clearance “A” = .004 -.008

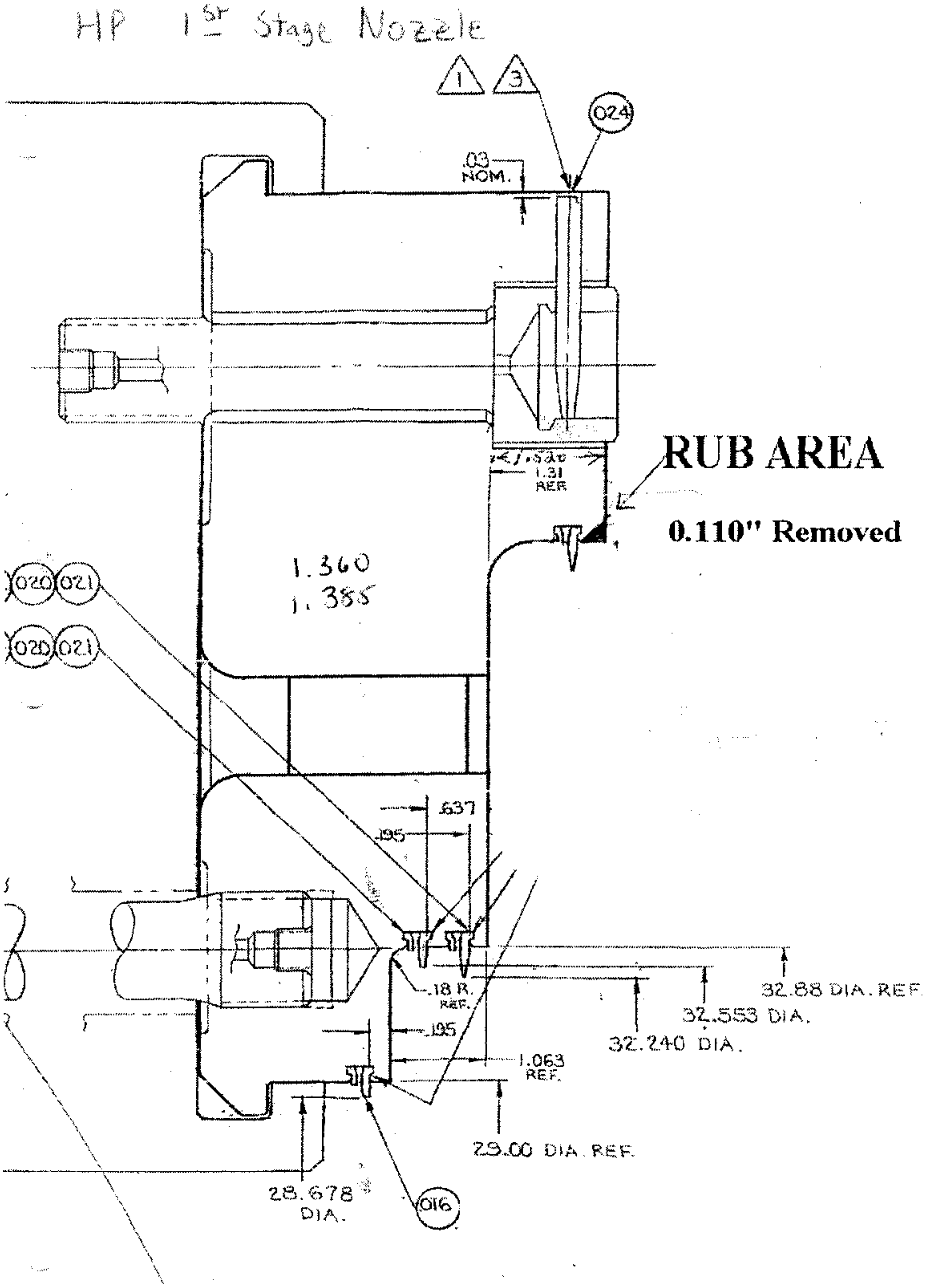
Note: HP steam inlet seal ring - ring sand nozzle have a lot of scale. Also rings have uneven steps in them on top

As Found __X_ Reading Taken By: _ K. Riley Date: _9/25/01__

As Charted ____ Reviewed By (W) Eng.: __________ Date: ____

HP 1st Stage Nozzle

Date: 9/25/2001 Turbine Serial No. ML Unit 1 Prepared By J. Lackner / E. Chik



RUB AREA

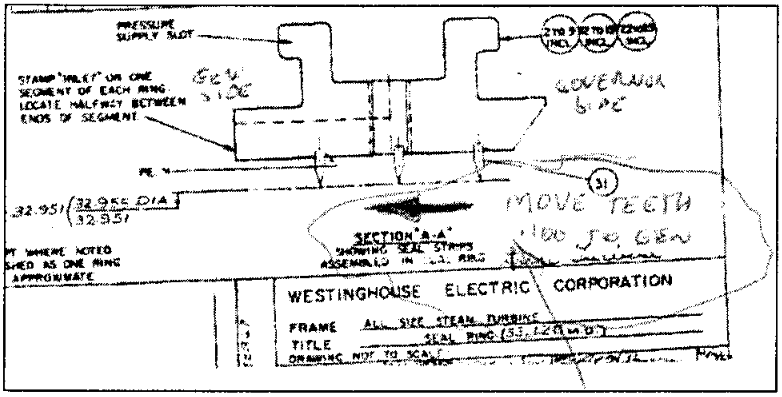
0.110" Removed

Comments
The HP nozzle had rubbed against the rotor during reassembly. The area denoted by "RUB AREA" should have been machined off of the new nozzle. This area was ground by hand to remove 0.110" of material as shown.

Mitchell Packing Ring Adjustments

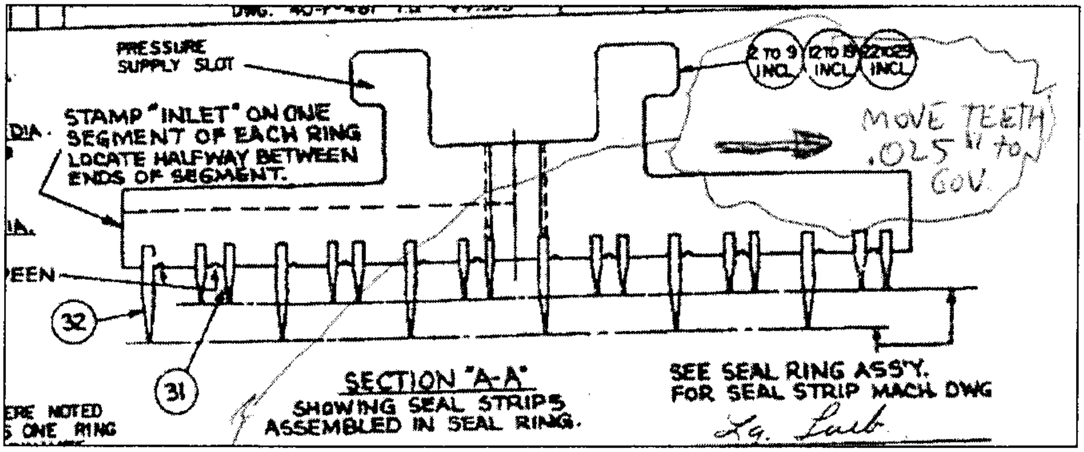
Date: 9/25/2001 Turbine Serial No. ML Unit 1 Prepared By J. Lackner / E. Chik

Stage 7 Spring Back Seals



Comments	
The teeth of the stage 7 spring back seals were moved 0.100" towards the generator from design position. Work was done by STAR per above drawing.	

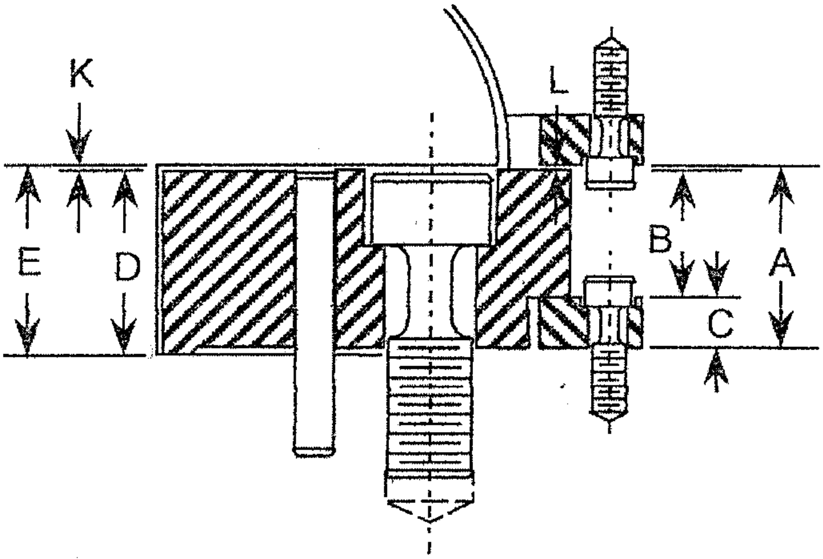
HP Dummy Ring Spring Back Seals



Comments	
The teeth of the spring back seals for the HP dummy ring were moved 0.025" towards the governor from design position. Work was done by STAR per above drawing.	

Support Key Clearances

Date: 10/3/01 Turbine Serial No. ML 1 Prepared By: D. Bordenkircher



Data Type: As Found

HP Section

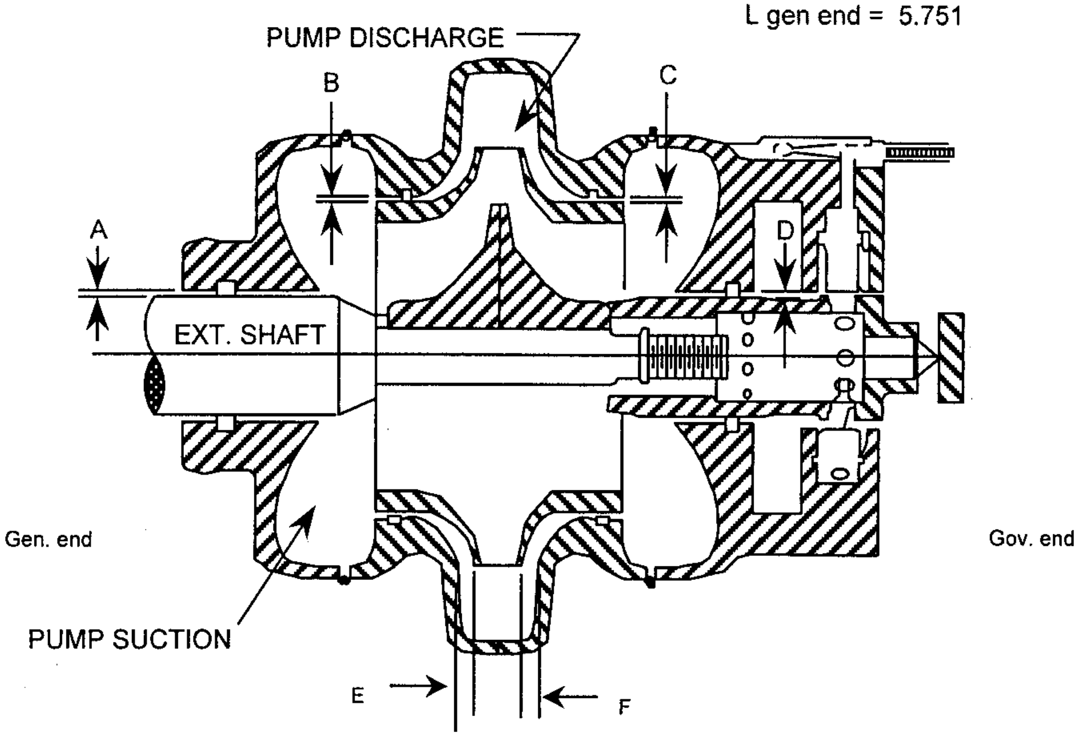
Component	Support Key to Upper Liner				Pocket Clearance		
	A	B	C	L (CLR)	E	D	K (CLR)
HP Blade Ring TE/L	2.497	1.742	0.745	0.010	2.496	2.495	0.001
HP Blade Ring TE/R	2.503	1.748	0.754	0.001	2.495	2.495	0.000
HP Blade Ring GE/L	3.778	2.720	1.057	0.001	3.759	3.757	0.002
HP Blade Ring GE/R	3.784	2.730	1.053	0.001	3.752	3.745	0.007
HP Dummy Ring - L	2.007	1.240	0.762	0.005	2.163	2.004	0.159
HP Dummy Ring - R	2.009	1.232	0.691	0.086	2.163	2.003	0.160
VHP Dummy Ring - L	2.355	1.497	0.748	0.110	2.247	2.245	0.002
VHP Dummy Ring - R	2.353	1.495	0.769	0.089	2.250	2.250	0.000
VHP Blade Ring - L	3.734	2.727	1.002	0.005	3.743	3.721	0.022
VHP Blade Ring - R	3.747	2.725	1.020	0.002	3.739	3.725	0.014
LP Dummy Ring - L	2.036	1.248	0.780	0.008	2.003	2.003	0.000
LP Dummy Ring - R	2.030	1.249	0.774	0.007	2.003	1.998	0.005

SIEMENS
WESTINGHOUSE

CUSTOMER: AEP	
LOCATION/UNIT #: MITCHELL #1	
MAIN OIL PUMP AXIAL & RADIAL CLEARANCE	
BB/FRAME:	JOB NO.:
COMPONENT/S.O.: HP	DWG.: 722J306

Spare rotor # TD35049

Rotor set on
L gen end = 5.751



DIMENSION	LS Bore	Bottom Bore	RS Bore
A			
B		n/a	
C		n/a	
D			
Axial Clr	LS	n/a	RS
E (Gen end)	0.505	n/a	0.44
F (Gov end)	0.495	n/a	0.435

FILE: F46582.PPT Rev. 00

As Found ________ Reading Taken By: __Brothers____________ Date: _10/19/01____

As Assembled ____X______ Reviewed By (W) Eng.: _______________ Date: __________

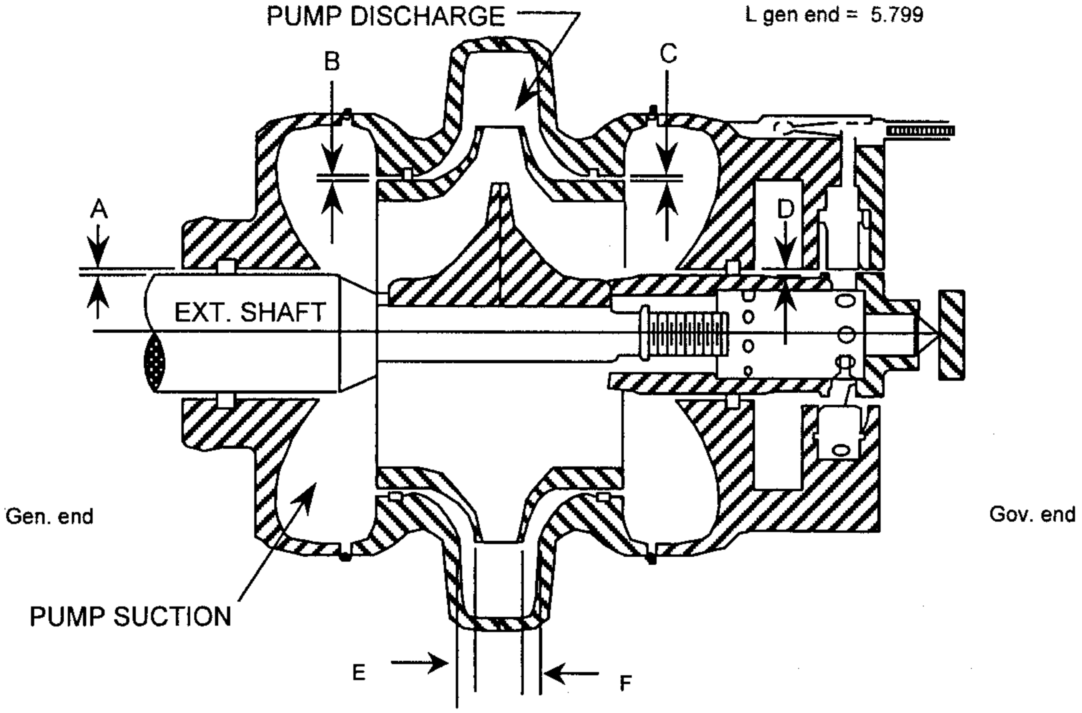
SIEMENS
WESTINGHOUSE

CUSTOMER: AEP	
LOCATION/UNIT #: MITCHELL #1	
MAIN OIL PUMP AXIAL & RADIAL CLEARANCE	
BB/FRAME:	JOB NO.:
COMPONENT/S.O.: HP	DWG.: 722J306

As found rotor # TD44466

Rotor set on "K" = .388 RS

L gen end = 5.799



DIMENSION	LS Bore	Bottom Bore	RS Bore
A	0.133		0.126
B	0.194	n/a	0.191
C	0.181	n/a	0.192
D	0.126		0.126
Axial Clr	LS	n/a	RS
E (Gen end)	0.378	n/a	0.318
F (Gov end)	0.486	n/a	0.510

FILE: F46582.PPT Rev. 00

As Found ____X____ Reading Taken By: __JBD, Fred____________ Date: _9/10/01____

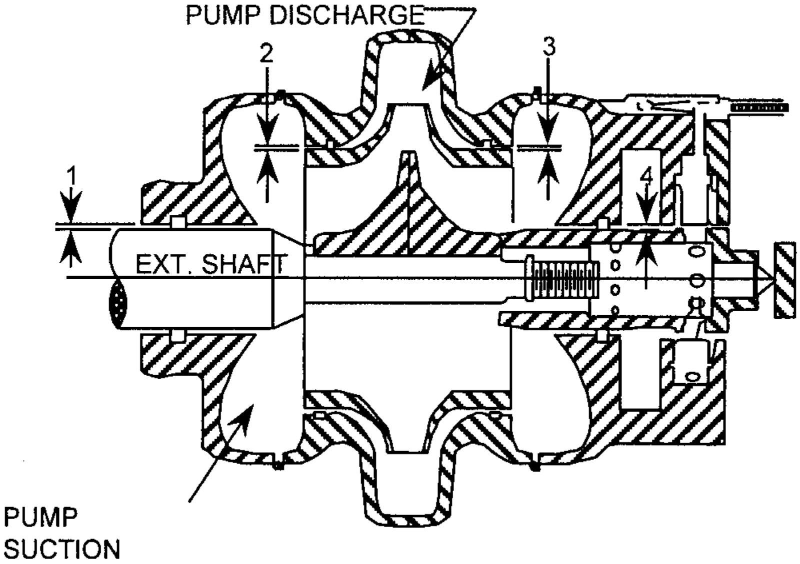
As Assembled __________ Reviewed By (W) Eng.: _______________ Date: __________

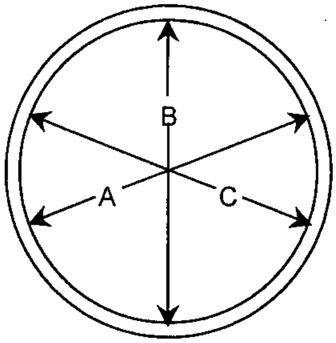
SIEMENS
WESTINGHOUSE

CUSTOMER: AEP
LOCATION/UNIT #: MITCHELL #1

MAIN OIL PUMP OIL SEAL RING CLRS

BB/FRAME: JOB NO.:
COMPONENT/S.O.: DWG.:





OIL SEAL

			DIAMETRIC CLEARANCE					
SEAL NO.	Groove Width	Ring thickness	Axial Clrs	A	B	C	SHAFT DIA.	MAX. CLR
1	0.628	0.622	0.006	5.500	5.499	5.499		
2	0.627	0.623	0.004	9.250	9.222	9.252		
3	0.627	0.624	0.003	9.279	9.220	9.251		
4	0.627	0.623	0.004	5.497	5.498	5.499		

Tool # Used ____________________ Cal. Due Date ___________

As Found ___X____ Reading Taken By: _Day & Night_______ Date: _9/24/01__

As Assembled __________ Reviewed By (W) Eng.: ______________ Date: __

FILE: MS022.PPT Rev. 01

SIEMENS
Westinghouse

CUSTOMER: AEP
LOCATION/UNIT #: MITCHELL #1

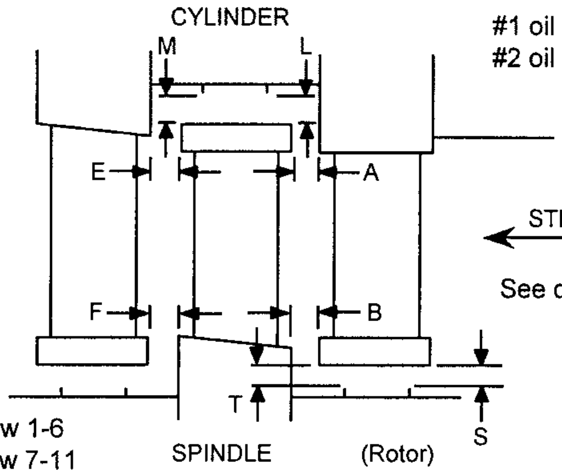
HP REACTION BLADING CLEARANCES

BB/FRAME: JOB NO.:
COMPONENT/S.O.: DWG.: 722J306

The rotor was set on "K" = .349" RS (Design .349")

Spare rotor # TD35049

#1 oil bore: LS 4.894, BOT 7.164, RS 4.395
#2 oil bore: LS 7.765, BOT 6.677, RS 7.810



STEAM FLOW

See drawing 722J306 for sketch

Blade ring #1 Gen -row 1-6
Blade ring #1 Gov- row 7-11

	LEFT SIDE								RIGHT SIDE							
ROW	A	B	L	M	S	T	E	F	A	B	L	M	S	T	E	F
1	0.356	0.300	0.027	0.033	0.026	0.026	0.365	0.370	0.349	0.305	0.052	0.060	0.060	0.057	0.384	0.432
2	0.355	0.308	0.030	0.036	0.026	0.026	0.370	0.392	0.342	0.265	0.056	0.062	0.050	0.053	0.370	0.400
3	0.590	0.530	0.030	0.030	0.024	0.032	0.608	0.608	0.592	0.523	0.060	0.057	0.050	0.052	0.618	0.650
4	0.365	0.315	0.020	0.026	0.025	0.027	0.335	0.370	0.340	0.270	0.042	0.050	0.047	0.054	0.350	0.375
5	0.364	0.310	0.027	0.032	0.023	0.035	0.345	0.390	0.365	0.290	0.050	0.050	0.052	0.055	0.355	0.392
6	0.352	0.290	0.040	0.042	0.027	0.037	0.422	__	0.340	0.270	0.050	0.052	0.055	0.053	0.445	__
7	0.743	0.385	0.030	0.030			0.668	0.510	0.752	0.375	0.048	0.052			0.697	0.487
8	0.737	0.400	0.030	0.036			0.663	0.450	0.743	0.448	0.047	0.057			0.690	0.476
9	0.757	0.490	0.036	0.040			0.670	0.470	0.738	0.465	0.052	0.060			0.702	0.475
10	0.742	0.472	0.040	0.040			0.542	0.309	0.728	0.471	0.052	0.050			0.580	0.320
11	1.186	0.386	0.050	0.052			0.378	__	1.153	0.366	0.055	0.050			0.415	__

Tool # Used ______________________________ Cal. Due Date __________

As Found _________ Reading Taken By: _J. Brothers____________ Date: _10/13/01____

As Assembled ____X____ Reviewed By (W) Eng.: ________________ Date: ______

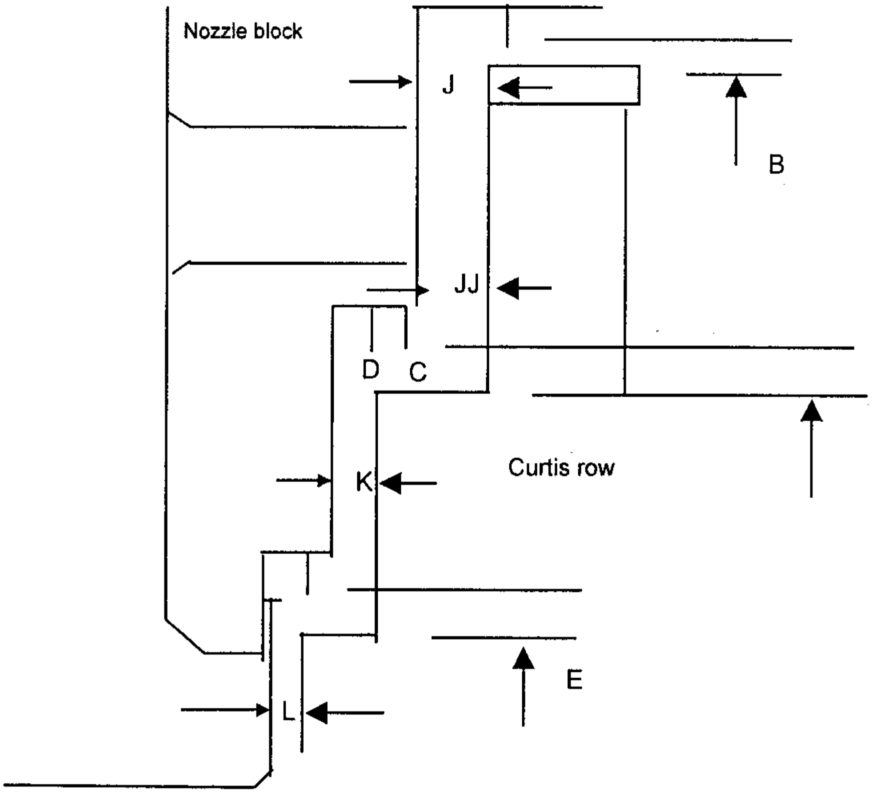
SIEMENS
WESTINGHOUSE

Spare rotor # TD35049

CUSTOMER: AEP	
LOCATION/UNIT #: MITCHELL 1	
AXIAL/RADIAL CLEARANCES CURTIS BLANDING	
BB/FRAME:	JOB NO.:
COMPONENT/S.O.:	DWG.: 722J306

DRAWING .349

K = SETTING .349



RADIAL					AXIAL					
DIM.	L	R			DIM.	L	R			
B	0.085	0.095			J	0.412	0.427			
C	0.077	0.107			JJ	0.280	0.293			
D	0.087	0.11			K	0.304	0.304			
E	0.077	0.103			L	0.285	0.300			

Tool # Used ______________________ Cal. Due Date __________

As Found __________ Reading Taken By: ______brothers__________________ Date: _10/13/01____

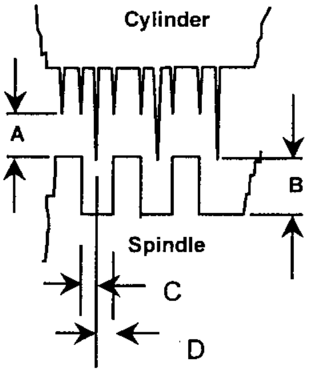
As Assembled ____X______ Reviewed By (W) Eng.: ______________________ Date: __________

SIEMENS
WESTINGHOUSE

CUSTOMER: AEP	
LOCATION/UNIT #: MITCHELL #1	
HP #1 blade ring Gov end spring back seal clearance	
BB/FRAME:	JOB NO.:
COMPONENT/S.O.:	DWG.: 722J306

Spare rotor # TD35049

K = .349 RS
L Gen = 5.732 RS Bar



HP BLADE RING #1 Gov. end

	RIGHT SIDE				LEFT SIDE	
ROW	A	B	C	D	A	B
7	0.078		0.000	0.368	0.042	
8	0.068	0.068	0.280	0.320	0.022	0.030
9	0.056	0.055	0.305	0.305	0.016	0.016
10	0.036	0.040	0.290	0.321	0.018	0.021
11	0.035	0.035	0.315	0.256	0.025	0.025

***** **Note** ******

These readings were taken prior to moving the T1 bearing 0.025” to the right and T-2 bearing 0.013 to the right.

Note:
1. Row numbering is counting from Gov. to Gen. End.
2. “C” is always GOV axial while “D” is GEN axial clearance.

FILE: F46579.PPT Rev. 00

Tool # Used ____________ Cal. Due Date ________

As Found ________ Reading Taken By: _Brothers ____________ Date: _10/13/01__

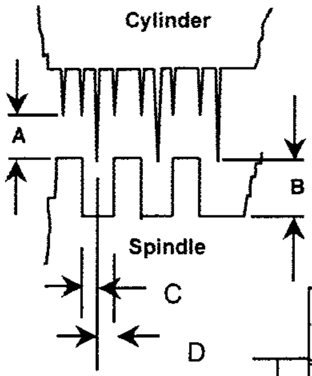
As Assembled________X____________________Reviewed By (W) Eng.: _______ Date: ___

SIEMENS
WESTINGHOUSE

CUSTOMER: AEP
LOCATION/UNIT #: MITCHELL #1

DUMMY & GLAND SPRING BACK SEAL CLEARANCES

BB/FRAME: JOB NO.:
COMPONENT/S.O.: DWG.: 722J306



Spare rotor # TD35049

__VHP___ TURBINE _HP,VHP,LP_ DUMMY
inner & outer gland

		LEFT SIDE				RIGHT SIDE	
	ROW	A	B	C	D	A	B
#1 outer gland	1						
	2						
#1 inner gland	3	0.002	0.002	0.280	0.510	0.046	0.045
	4	0.0015	0.000	0.295	0.488	0.045	0.042
	5	0.002	0.002	0.290	0.492	0.042	0.042
HP dummy	6	0.037	0.030	0.270	0.195	0.053	0.042
VHP dummy	7	0.056	0.056	0.250	0.212	0.092	0.090
	8	0.052	0.055	0.230	0.240	0.090	0.092
	9	0.045	0.045	0.272	0.195	0.072	0.072
	10	0.040	0.040	0.248	0.215	0.076	0.076
	11	0.036	0.036	0.248	0.210	0.072	0.072
	12	0.027	0.027	0.258	0.212	0.067	0.065
LP dummy	13	0.027	0.023	0.355	0.302	0.050	0.072
	14	0.032	0.031	0.332	0.312	0.062	0.060
	15	0.032	0.026	0.365	0.285	0.062	0.052
#2 inner gland	16	0.025	0.020	0.285	0.192	0.052	0.052
	17	0.026	0.028	0.275	0.186	0.057	0.060
	18	0.015	0.015	0.266	0.192	0.036	0.036
#2 outer gland	19						
	20						

***** **Note** ******
These readings were taken prior to moving the T1 bearing 0.025" to the right and T-2 bearing 0.013 to the right. Some of the readings were spot checked and are on the next page.

K = .349 RS
L GEN = 5.732 RS Bar

Note:
1. Row numbering is counting from Gov. to Gen. End.
2. "C" is always GOV axial while "D" is GEN axial clearance.

FILE: F46579.PPT Rev. 00

Tool # Used ______________________ Cal. Due Date __________

As Found _________ Reading Taken By: _J.Brothers ________________ Date: _10/13/01__

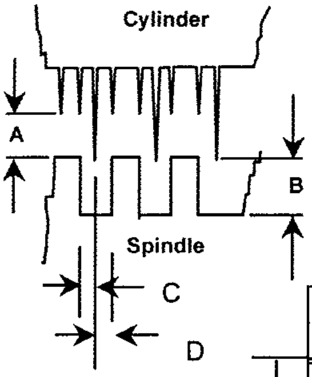
As Assembled________X____ _Reviewed By (W) Eng.: ______________________ Date: ___________

**SIEMENS
WESTINGHOUSE**

CUSTOMER: AEP
LOCATION/UNIT #: MITCHELL #1

DUMMY & GLAND SPRING BACK SEAL CLEARANCES

BB/FRAME:
JOB NO.:
COMPONENT/S.O.:
DWG.: 722J306



Spare rotor # TD35049

___VHP____ TURBINE _inner gland

		LEFT SIDE				RIGHT SIDE	
	ROW	A	B	C	D	A	B
#1 outer gland	1						
	2						
#1 inner gland	3	0.032	0.030			0.025	0.025
	4						
	5						
HP dummy	6						
VHP dummy	7						
	8						
	9						
	10						
	11						
	12						
LP dummy	13						
	14						
	15						
#2 inner gland	16						
	17						
	18	0.025	0.034			0.022	0.025
#2 outer gland	19						
	20						

> ******* Note ********
> **These readings are spot checks after moving the T1 bearing 0.025" to the right and T-2 bearing 0.013 to the right.**

#1 oil bore: LS 4.920, BOT 7.170, RS 4.374
#2 oil bore: LS 7.780, BOT 6.620, RS 7.794

Note:
1. Row numbering is counting from Gov. to Gen. End.
2. "C" is always GOV axial while "D" is GEN axial clearance.

As Found _________
Reading Taken By: _J.Brother ________________
Date: _10/19/01__

As Assembled_________X_____
Reviewed By (W) Eng.: ______________________
Date: __________

SIEMENS
Westinghouse

CUSTOMER: AEP
LOCATION/UNIT #: MITCHELL #1

HP ROTOR FLOAT

BB/FRAME: JOB NO.:
COMPONENT/S.O.: DWG.: 722J306

Spare rotor # TD35049

S.E.M =	
"L" GEN =	5.768
RS GEN END "K" =	.369 (design .349)

ASSEMBLY RECORD					
CONDITION	TO GOV.	TO GEN.	TRAVEL FWD	TRAVEL AFT	TOTAL TRAVEL
"K"					
"L" GEN	5.565	5.965	0.203	0.197	0.400
Contact Point	HP dummy ring seal	Row 1M seal			
Design contact point	VIEW M	VIEW M	Design =.230	Design =.230	Design =.460

Note: Taken prior to install HP inner cylinder cover

FILE: LP045.PPT Rev. 00

Tool # Used ____________________ Cal. Due Date __________

As Found __________ Reading Taken By: ____Brothers_______ Date: _10-22-01_____

As Assembled ____X_____ Reviewed By (W) Eng.: ______________ Date: _________

SIEMENS
Westinghouse

CUSTOMER: AEP	
LOCATION/UNIT #: MITCHELL #1	
HP ROTOR FLOAT	
BB/FRAME:	JOB NO.:
COMPONENT/S.O.:	DWG.: 722J306

Spare rotor # TD35049

S.E.M =	
"L" GEN =	5.768
RS GEN END "K" =	.369 (design .349)

ASSEMBLY RECORD					
CONDITION	TO GOV.	TO GEN.	TRAVEL FWD	TRAVEL AFT	TOTAL TRAVEL
"K"	0.175	0.563	0.194	0.194	0.388
"L" GEN	5.578	5.967	0.19	0.199	0.389
Contact Point	HP dummy ring seal	Row 1M seal			
Design contact point	VIEW M	VIEW M	Design =.230	Design =.230	Design =.460

Note: no top half components installed & no outer gland lower half spring back seals

Curtis rotating blade to nozzle block dimension (with rotor at "K" position):

LS = .295"

RS = .285"

Tool # Used ____________________ Cal. Due Date __________

As Found __________ Reading Taken By: ____Brothers_______ Date: _10-21-01_____

As Assembled ____X_____ Reviewed By (W) Eng.: _______________ Date: _________

FILE: LP045.PPT Rev. 00

PAC[illegible] AND ROW MACHINE INFORMATION

LOCATION	REQUIRED RAD. CLR.	ACTUAL RADIAL CLEARANCE		REQUIRED BUTT CLEAR.	ACTUAL BUTT CLEAR.
		LEFT SIDE	RIGHT SIDE		
HP Steam Seal 7S	.005			-0-	.001
8S	.035				.003
9S					.001
10S					.005
11S					.003
HP Dummy	.035				.005
VHP Dummy A	.035				.006
B	.040				.001
C	.045				.011
D	.050				.009
E	.055				.010
F	.060				.006
LP Dummy A	.035				.003
B	.035				.002
C	.035				.002
InnerGld. #2 GE	.020				.002
Inner Gld #1 GE In	.020				.009
" Otr	.020				.011
InnerGld #2 TE	.020				.003
Inner Gld #1 TE In	.020				.003
" Otr	.020				.004
Outer Gld Outer Ring	TE .030				.005
Outer Gld. ~~Inner~~ Inner Ring	TE .020				.003
Outer Gld. Outer Ring	GE .030				.001
Outer Gld. Inner Ring	GE .020				.002

CUSTOMER :

QUANTITY

JOB NUMBER

STEAM TURBINE ALTERNATIVE RESOURCES

TOLERANCES

FRACTIONS ±1\64	.00 ±.010
ANGLES ±15′	.000 ±.005

MATERIAL

DRAWING NUMBER

INFORMATION

PAC AND ROW MACHINE INFORMATION

LOCATION	REQUIRED RAD. CLR.	ACTUAL RADIAL CLEARANCE		REQUIRED BUTT CLEAR.	ACTUAL BUTT CLEAR.
		LEFT SIDE	RIGHT SIDE		
LP Outer TE	.030	.040	10-5-01 .040	0	-.009
		OK	J. Lackner		
LP Inner TE Ⓐ	.020	.028	.022	0	-.001
" Ⓑ	.020	.028	.023	0	-.003
" Ⓒ	.020	.027	.022	0	-.005
LP Inner GE Ⓐ	.020	.023	.017	0	-.002
" Ⓑ	.020	.022	.016	0	-.001
" Ⓒ	.020	.018	.022	0	-.028
LP Outer TE	.030	.032	.033	0	-.020
BFPT GE 6	.013	.016	.014	-.100	-.106
" 5	.013	.014	.013	-.100	-.100
" 4	.013	.012	.012	-.100	-.098
BFPT TE 3	.013	.010	.014	-.100	-.099
" 2	.013	.012	.015	-.100	-.130
" 1	.013	.012	.015	-.100	-.101
		OK	J. Lackner - 10-3-01		
LP 3.5 TE	.080	.085	.065	0	0
LP 3.5' GE	.080	.085	.065	0	0

CUSTOMER :
AEP - Mitchell LP Sec.
Unit #1

Q NTITY

JOB NUMBER

STEAM TURBINE ALTERNATIVE RESOURCES

TOLERANCES

FRACTIONS ±1\64
.00 ±.010
ANGLES ±15′
.000 ±.005

MATERIAL —

DRAWING NUMBER
INFORMATION

SIEMENS
WESTINGHOUSE

CUSTOMER: AEP

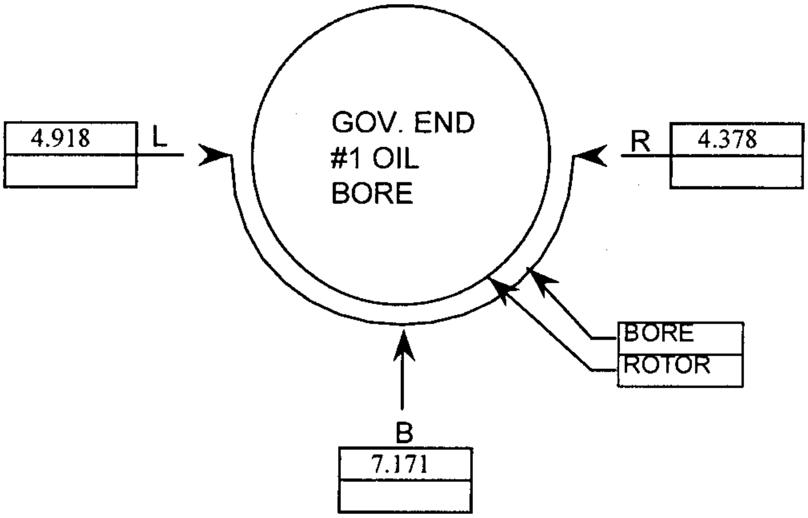
LOCATION/UNIT #: Mitchell #1

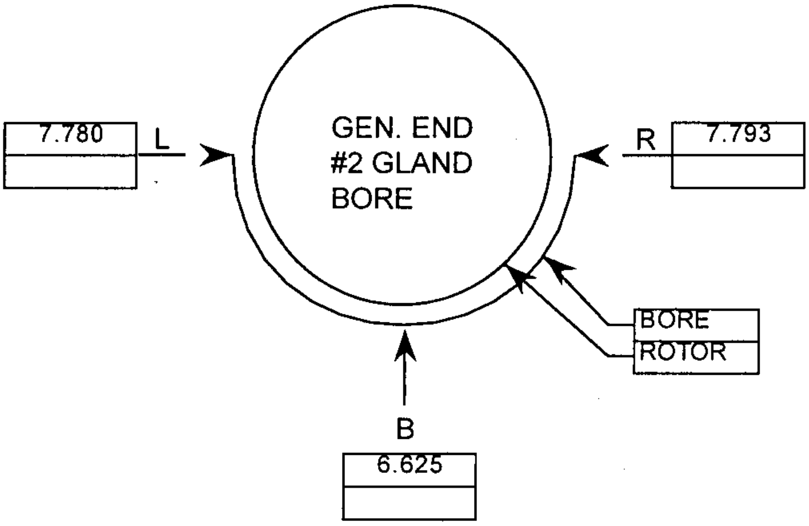
VHP/HP GLAND BORE

BB/FRAME: JOB NO.:

COMPONENT/S.O.: VHP/HP ROTOR

Spare rotor # TD35049 Final Data





Tool # Used ____________________ Cal. Due Date __________

As Found __________ Reading Taken By: ___Brothers________ Date: _10/21/01_____

As Charted ____X______ Reviewed By (W) Eng.: ________________ Date: ____________

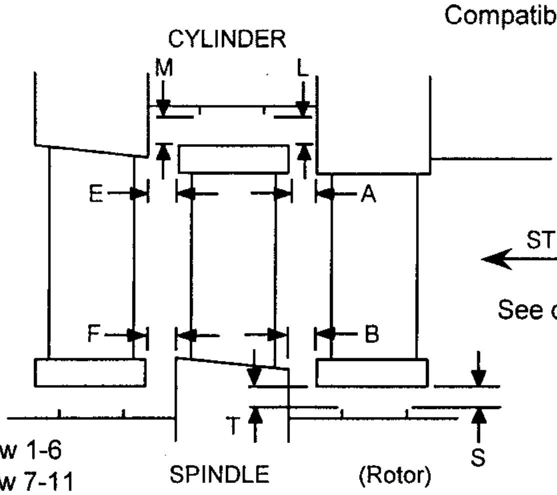
FILE: HP023.PPT Rev. 01

SIEMENS
Westinghouse

CUSTOMER: AEP	
LOCATION/UNIT #: MITCHELL #1	
HP REACTION BLADING CLEARANCES	
BB/FRAME:	JOB NO.:
COMPONENT/S.O.:	DWG.: 722J306

The rotor was set on "K" = .349" RS (Design .349")
L Gen = 5.726

Spare rotor # TD35049
Compatibility Data



See drawing 722J306 for sketch

Blade ring #1 Gen -row 1-6
Blade ring #1 Gov- row 7-11

Row 7-11
S, T are spring back seal
S short seal, T long seal

	LEFT SIDE								RIGHT SIDE							
ROW	A	B	L	M	S	T	E	F	A	B	L	M	S	T	E	F
1	0.348	0.293	n/a	n/a	0.115	0.065	0.375	0.392	0.342	0.305	n/a	n/a	0.091	0.073	0.391	0.435
2	0.356	0.302	n/a	n/a	0.038	0.075	0.368	0.405	0.341	0.267	n/a	n/a	0.083	0.066	0.375	0.402
3	0.591	0.530	n/a	n/a	0.038	0.088	0.615	0.599	0.596	0.531	n/a	n/a	0.090	0.069	0.618	0.653
4	0.352	0.302	n/a	n/a	0.037	0.086	0.348	0.382	0.338	0.276	n/a	n/a	0.092	0.072	0.345	0.379
5	0.362	0.300	n/a	n/a	0.042	0.085	0.346	0.392	0.368	0.303	n/a	n/a	0.089	0.067	0.354	0.398
6	0.356	0.285	n/a	n/a	0.046	0.087	0.419	__	0.349	0.279	n/a	n/a	0.096	0.069	0.427	__
7	0.768	0.422	n/a	n/a			0.651	0.500	0.786	0.476	n/a	n/a			0.668	0.457
8	0.741	0.440	n/a	n/a			0.651	0.426	0.758	0.501	n/a	n/a			0.666	0.453
9	0.763	0.512	0.055	0.045			0.656	0.441	0.767	0.491	n/a	n/a			0.684	0.448
10	0.758	0.493	0.060	0.053			0.531	0.293	0.749	0.496	n/a	n/a			0.559	0.296
11	1.178	0.403	0.070	0.063			0.366	__	1.184	0.391	n/a	n/a			0.392	__

n/a - damaged seal

Tool # Used ______________________________ Cal. Due Date __________

As Found _________ Reading Taken By: _K. Riley____________ Date: _9/12/01____

As Charted ____X____ Reviewed By (W) Eng.: ________________ Date: ______

SIEMENS
WESTINGHOUSE

CUSTOMER: AEP
LOCATION/UNIT #: MITCHELL 1

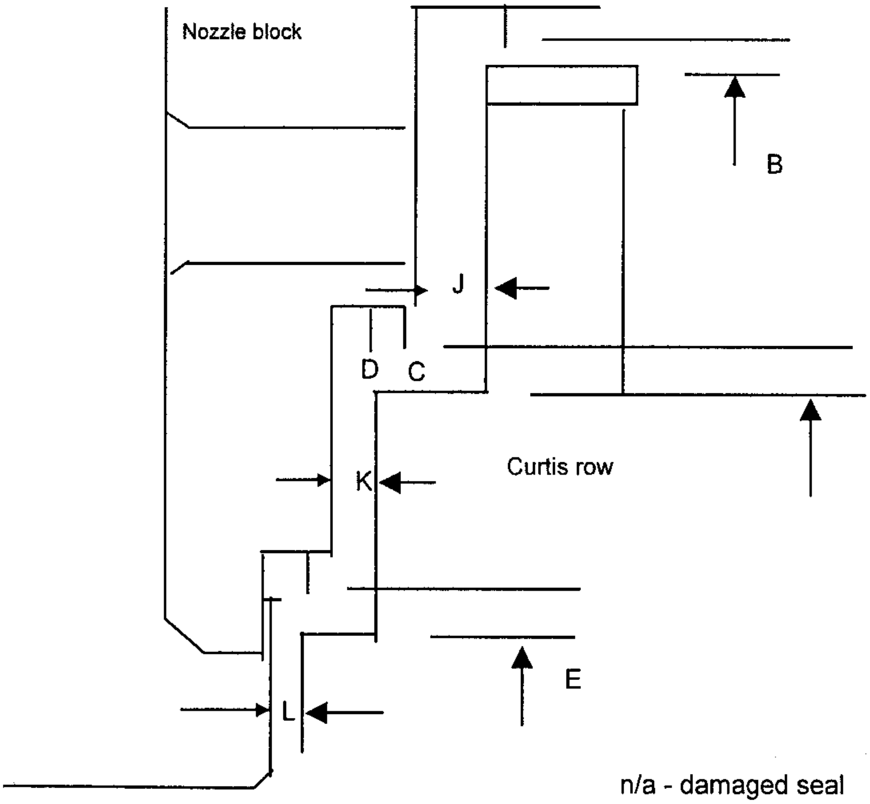
AXIAL/RADIAL CLEARANCES CURTIS BLANDING

BB/FRAME: JOB NO.:
COMPONENT/S.O.: DWG.: 722J306

Spare rotor # TD35049
Compatibility Data

DRAWING .349
K = SETTING .349

L GEN = 5.726



n/a - damaged seal

RADIAL					AXIAL					
DIM.	L	R			DIM.	L	R			
B	0.09	n/a			J	0.300	0.298			
C	n/a	0.111			K	0.300	0.300			
D	0.090	0.097			L	0.280	0.288			
E	0.08	0.100								

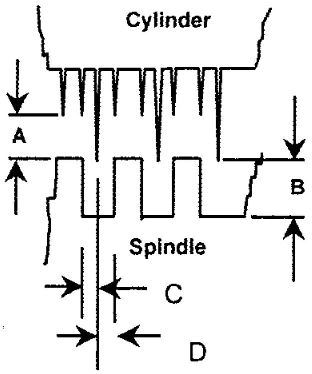
Tool # Used ______________________ Cal. Due Date __________

As Found __________ Reading Taken By: ______brothers__________________ Date: _9/12/01____

As Charted ____X______ Reviewed By (W) Eng.: ______________________ Date: __________

FILE: F46577.PPT Rev. 00

SIEMENS
WESTINGHOUSE



CUSTOMER: AEP
LOCATION/UNIT #: MITCHELL #1

DUMMY & GLAND SPRING BACK SEAL CLEARANCES

BB/FRAME: JOB NO.:
COMPONENT/S.O.: DWG.: 722J306

Spare rotor # TD35049 Compatibility Data

___HP____ TURBINE _HP,VHP,LP_ DUMMY
inner & outer gland

		LEFT SIDE				RIGHT SIDE	
	ROW	A	B	C	D	A	B
#1 outer gland	1	0.029	0.031	.318/.243	0.450	0.032	0.031
	2	0.031	0.028	0.303	0.468	0.032	0.028
#1 inner gland	3	0.018	0.017	0.251	0.512	0.030	0.028
	4	0.019	0.021	0.290	0.480	0.030	0.032
	5	0.013	0.022	0.275	0.480	0.027	0.031
HP dummy	6 *	0.100	0.105	0.290	0.167	0.092	0.111
VHP dummy	7	0.066	0.057	0.275	0.202	0.090	0.089
	8	0.023	0.021	0.272	0.200	0.082	0.075
	9	0.023	0.026	0.252	0.205	0.067	0.066
	10	0.037	0.041	0.251	0.205	0.063	0.063
	11	0.032	0.041	0.259	0.204	0.056	0.055
	12	0.029	0.041	0.252	0.214	0.050	0.048
LP dummy	13	0.041	0.042	0.345	0.315	0.062	0.059
	14	0.055	0.050	0.360	0.303	0.056	0.048
	15	0.046	0.043	0.361	0.300	0.060	0.052
#2 inner gland	16	0.031	0.029	0.277	0.180	0.030	0.030
	17	0.033	0.031	0.277	0.185	0.032	0.031
	18	0.017	0.018	0.276	0.184	0.021	0.024
#2 outer gland	19	0.030	0.031	0.380	0.270	0.027	0.030
	20	0.032	0.031	0.378	0.282	0.030	0.029

K = .349 RS
L GEN = 5.726

Note:
1. Row numbering is counting from Gov. to Gen. End.
2. "C" is always GOV axial while "D" is GEN axial clearance.

* - 1. Recommend to check HP dummy ring top on & top off roundness check.
- 2. HP dummy ring row 6 - recommend to ship long & short seal strip toward Gov. end .025"

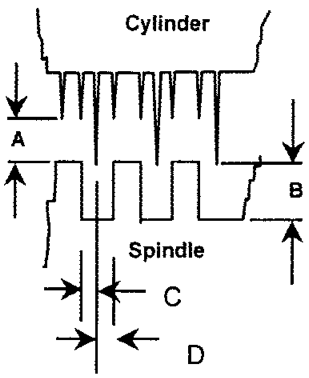
FILE: F46579.PPT Rev. 00

Tool # Used ______________________________ Cal. Due Date __________

As Found _________ Reading Taken By: _K.Riley ________________ Date: _9/12/01__

As Charted________X___________Reviewed By (W) Eng.: _______ Date: ___

SIEMENS
WESTINGHOUSE



CUSTOMER: AEP
LOCATION/UNIT #: MITCHELL #1
HP #1 blade ring Gov end spring back seal clearance
BB/FRAME: JOB NO.:
COMPONENT/S.O.: DWG.: 722J306

Spare rotor # TD35049 Compatibility Data

___HP____ TURBINE _HP #1 blade ring Gov. end

HP BLADE RING #1 Gov. end

K = .349 RS
L GEN = 5.726

	RIGHT SIDE				LEFT SIDE	
ROW	A	B	C	D	A	B
7 **			0.000	0.337		
8			0.311	0.298		
9			0.297	0.301		
10			0.306	0.289		
11			0.337	0.252		

Note:
1. Row numbering is counting from Gov. to Gen. End.
2. “C” is always GOV axial while “D” is GEN axial clearance.

** - Row 7S spring back seal (row 7 shroud seal & ride on the back side of HP dummy ring). Recommend to ship long seal strip toward Gen. end .100”

Tool # Used ____________________ Cal. Due Date __________

As Found _________ Reading Taken By: _K.Riley ________________ Date: _9/12/01__

As Charted________X___________Reviewed By (W) Eng.: _______ Date: ___

SIEMENS

Westinghouse

CUSTOMER: AEP	
LOCATION/UNIT #: MITCHELL #1	
HP ROTOR FLOAT	
BB/FRAME:	JOB NO.:
COMPONENT/S.O.:	DWG.: 722J306

Spare rotor # TD35049
Compatibility Data

S.E.M =	
"L" GEN =	5.726
RS GEN END "K" =	0.349

ASSEMBLY RECORD

CONDITION	TO GOV.	TO GEN.	TRAVEL FWD	TRAVEL AFT	TOTAL TRAVEL
S.E.M.					
"L" GEN	5.572	5.979	0.154	0.253	0.407
Contact Point	HP dummy ring spring back seal	VHP dummy ring spring back seal			
Design contact point	VIEW M	VIEW M	Design =.230	Design =.230	Design =.460

FILE: LP045.PPT Rev. 00

Tool # Used ____________________ Cal. Due Date __________

As Found __________ Reading Taken By: __Day shift_________ Date: _9/12/01_____

As Charted ____X_____ Reviewed By (W) Eng.: ______________ Date: _________

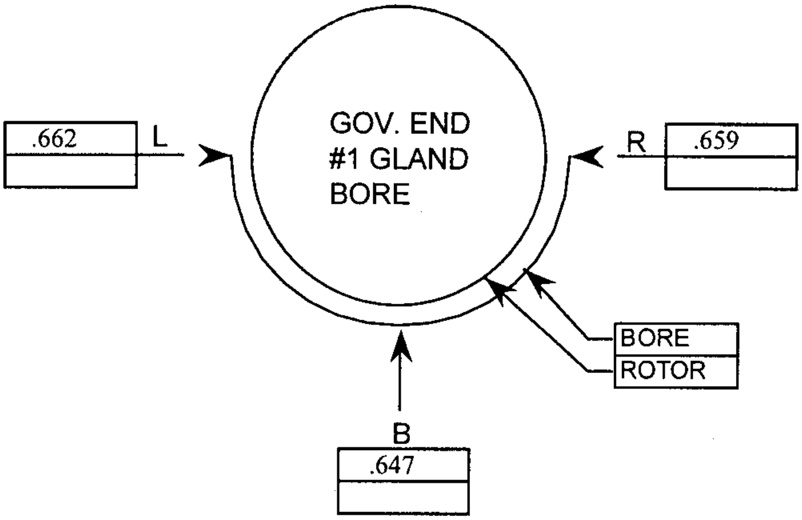
SIEMENS
WESTINGHOUSE

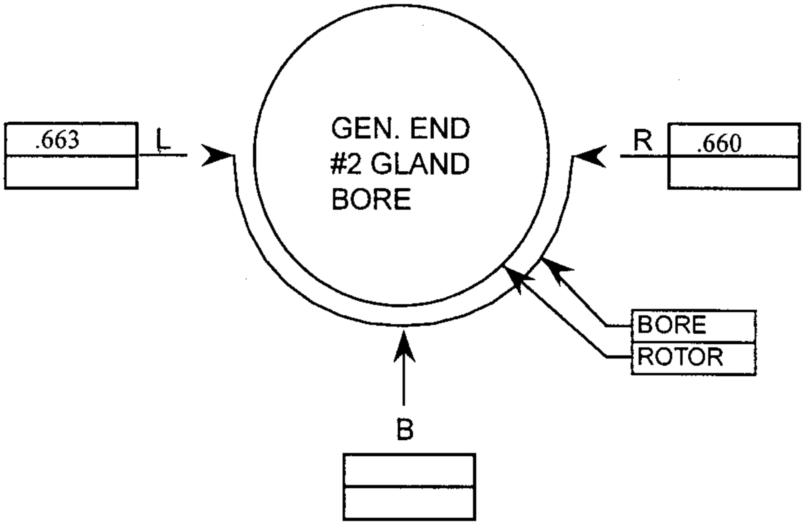
CUSTOMER: AEP
LOCATION/UNIT #: Mitchell #1

VHP/HP GLAND BORE

BB/FRAME: JOB NO.:
COMPONENT/S.O.: VHP/HP ROTOR

Spare rotor # TD35049 Compatibility Data





Tool # Used ______________________ Cal. Due Date __________

As Found __________ Reading Taken By: ___Brothers________ Date: _9/12/01_____

As Charted __________ Reviewed By (W) Eng.: ______________________ Date: __________

HP023.PPT Rev. 01

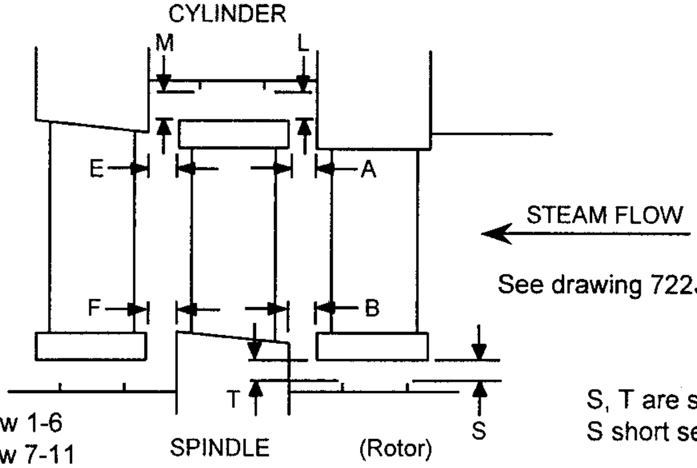
SIEMENS
Westinghouse

CUSTOMER: AEP	
LOCATION/UNIT #: MITCHELL #1	
HP REACTION BLADING CLEARANCES	
BB/FRAME:	JOB NO.:
COMPONENT/S.O.:	DWG.: 722J306

The rotor was set on "K" = .388" RS (Design .349")
L Gen = 5.799

As found rotor # TD44466

Rotor was set to as found "L" dimension which was recorded with thrust bearing still assembled.



See drawing 722J306 for sketch

S, T are spring back seal
S short seal, T long seal

Blade ring #1 Gen -row 1-6
Blade ring #1 Gov- row 7-11

	LEFT SIDE								RIGHT SIDE							
ROW	A	B	L	M	S	T	E	F	A	B	L	M	S	T	E	F
1	0.413	0.355	n/a	n/a	0.101	0.044	0.296	0.314	0.388	0.360	n/a	n/a	0.040	0.038	0.318	0.370
2	0.403	0.353	n/a	n/a	0.046	0.040	0.278	0.338	0.388	0.314	n/a	n/a	0.038	0.042	0.300	0.338
3	0.647	0.585	n/a	n/a	0.046	0.046	0.555	0.525	0.635	0.596	n/a	n/a	0.040	0.046	0.570	0.582
4	0.397	0.383	n/a	n/a	0.048	0.041	0.304	0.299	0.384	0.345	n/a	n/a	0.042	0.046	0.260	0.288
5	0.385	0.376	n/a	n/a	0.051	0.042	0.321	0.318	0.389	0.375	n/a	n/a	0.050	0.043	0.275	0.315
6	0.388	0.354	0.042	0.041	0.046	0.051	0.387	__	0.387	0.348	0.046	0.052	0.050	0.045	0.384	__
7	0.724	0.376	n/a	n/a	__	__	0.704	0.542	0.732	0.408	n/a	n/a	__	__	0.720	0.510
8	0.708	0.386	0.074	n/a	__	__	0.691	0.466	0.714	0.437	n/a	n/a	__	__	0.710	0.490
9	0.714	0.445	0.055	0.057	__	__	0.705	0.483	0.705	0.427	n/a	n/a	__	__	0.720	0.498
10	0.695	0.428	0.061	0.065	__	__	0.584	0.336	0.692	0.432	n/a	n/a	__	__	0.607	0.345
11	1.016	0.329	0.073	0.073	__	__	0.426	__	1.013	0.331	0.075	0.056	__	__	0.440	__

n/a - damaged seal

Tool # Used ______________________________ Cal. Due Date __________

As Found ____X______ Reading Taken By: _Brothers, Riley____________ Date: _9/9 -9/10____

As Assembled ________ Reviewed By (W) Eng.: ________________ Date: ______

SIEMENS
WESTINGHOUSE

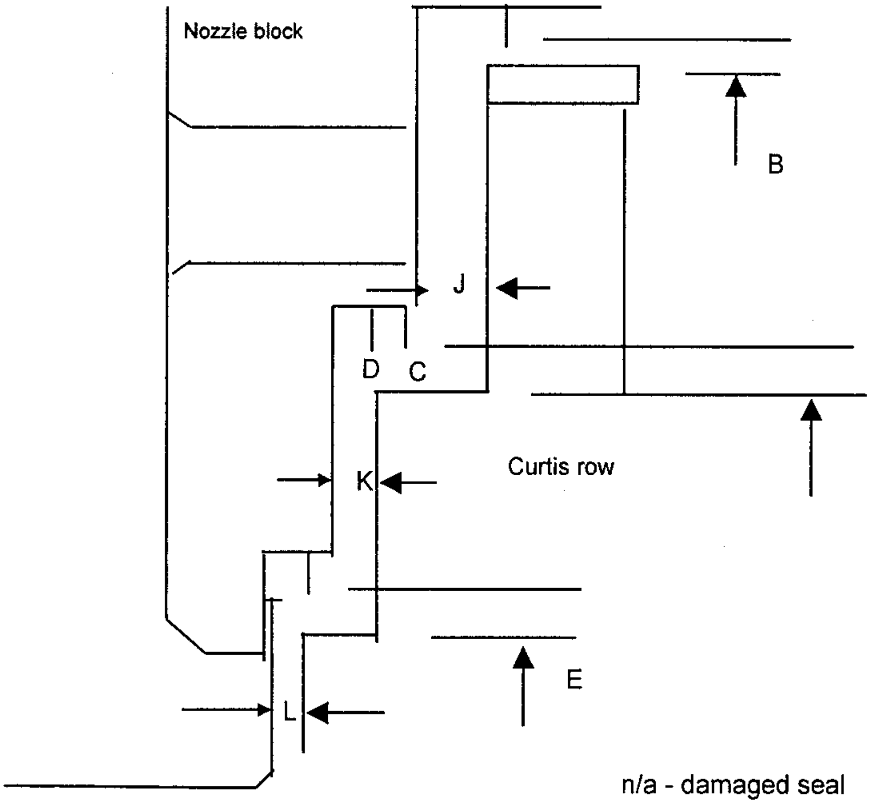
CUSTOMER: AEP	
LOCATION/UNIT #: MITCHELL 1	
AXIAL/RADIAL CLEARANCES CURTIS BLANDING	
BB/FRAME:	JOB NO.:
COMPONENT/S.O.:	DWG.: 722J306

As found rotor # TD44466

DRAWING .349

K = SETTING .388

L GEN = 5.799



n/a - damaged seal

RADIAL					AXIAL					
DIM.	L	R			DIM.	L	R			
B	0.075	0.115			J	0.232	0.224			
C	n/a	0.100			K	0.240	0.235			
D	0.090	0.095			L	0.210	0.222			
E	0.085	0.095								

Tool # Used ____________

Cal. Due Date ____________

As Found X

Reading Taken By: brothers

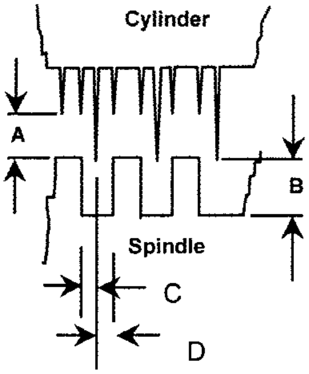
Date: 9/11/01

As Assembled ____________

Reviewed By (W) Eng.: ____________

Date: ____________

SIEMENS
WESTINGHOUSE



CUSTOMER: AEP
LOCATION/UNIT #: MITCHELL #1
DUMMY & GLAND SPRING BACK SEAL CLEARANCES
BB/FRAME: JOB NO.:
COMPONENT/S.O.: DWG.: 722J306

As found rotor # TD44466

__HP____ TURBINE _HP,VHP,LP_ DUMMY
inner & outer gland

		LEFT SIDE				RIGHT SIDE	
	ROW	A	B	C	D	A	B
#1 outer gland	1	0.031	0.034	.195/.260	.495/.505	0.025	0.025
	2	0.033	0.032	0.240	0.524	0.026	0.020
#1 inner gland	3	0.027	0.025	0.192	0.577	0.030	0.025
	4	0.031	0.027	0.245	0.522	0.027	0.024
	5	0.030	0.030	0.217	0.545	0.027	0.021
HP dummy	6	0.098	0.106	0.220	0.240	0.081	0.092
VHP dummy	7	0.072	0.066	0.195	0.270	0.077	0.074
	8	0.064	0.055	0.182	0.275	0.071	0.065
	9	0.065	0.065	0.180	0.282	0.061	0.053
	10	0.047	0.052	0.177	0.279	0.056	0.051
	11	0.045	0.050	0.180	0.276	0.043	0.038
	12	0.041	0.052	0.173	0.287	0.041	0.036
IP dummy	13	0.057	0.057	0.297	0.355	0.045	0.046
	14	0.062	0.058	0.302	0.356	0.041	0.040
	15	0.062	0.060	0.312	0.344	0.041	0.031
#2 inner gland	16	0.028	0.028	0.205	0.240	0.027	0.031
	17	0.030	0.029	0.212	0.230	0.031	0.030
	18	0.020	0.018	0.211	0.222	0.022	0.023
#2 outer gland	19	0.026	0.030	0.355	0.304	0.025	0.025
	20	0.032	0.031	0.325	0.321	0.030	0.030

K = .388 RS
L GEN = 5.799

Note:
1. Row numbering is counting from Gov. to Gen. End.
2. "C" is always GOV axial while "D" is GEN axial clearance.

FILE: F46579.PPT Rev. 00

Tool # Used ______________________________ Cal. Due Date __________

As Found ____X_____ Reading Taken By: __Riley __________________ Date: _9/10/01__

As Left________________________Reviewed By (W) Eng.: _______ Date: ___

SIEMENS
Westinghouse

CUSTOMER: AEP	
LOCATION/UNIT #: MITCHELL #1	
HP ROTOR FLOAT	
BB/FRAME:	JOB NO.:
COMPONENT/S.O.:	DWG.:

As found rotor # TD44466

S.E.M =	
"L" GEN =	5.799
RS GEN END "K" =	.388 (Design = .349)

ASSEMBLY RECORD					
CONDITION	TO GOV.	TO GEN.	TRAVEL FWD	TRAVEL AFT	TOTAL TRAVEL
S.E.M.					
"L" GEN	5.566	5.996	0.233	0.197	0.430
Contact Point					
Design contact point	VIEW M	VIEW M	Design =.230	Design =.230	Design =.460

FILE: LP045.PPT Rev. 00

Tool # Used ______________________________ Cal. Due Date __________

As Found _____X_____ Reading Taken By: __Night shift_________ Date: _9/11/01_____

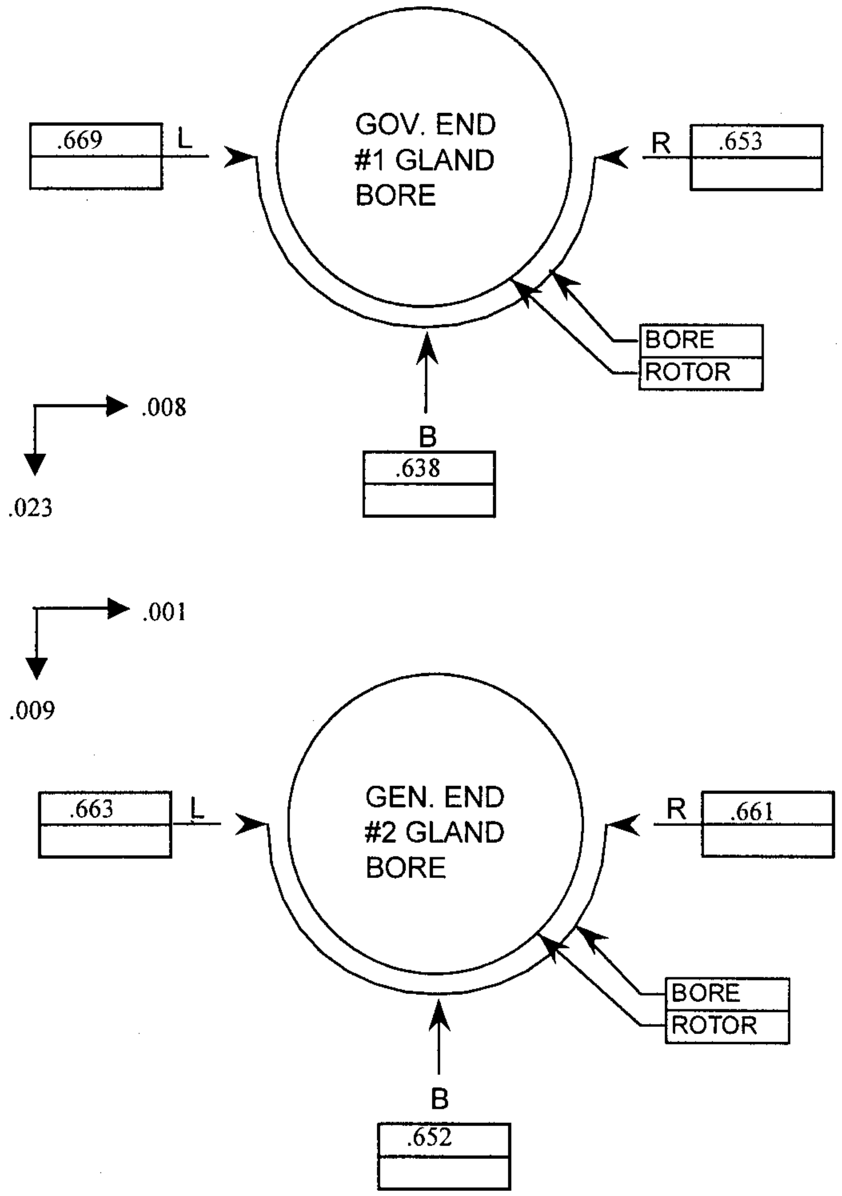
As Assembled _________ Reviewed By (W) Eng.: ______________ Date: _________

SIEMENS
WESTINGHOUSE

CUSTOMER: AEP
LOCATION/UNIT #: Mitchell #1

VHP/HP GLAND BORE

BB/FRAME: JOB NO.:
COMPONENT/S.O.: VHP/HP ROTOR



Tool # Used ______________ Cal. Due Date __________

As Found _____X_____ Reading Taken By: ___Brothers, Day & Night Shift________ Date: _9/10/01_____

As Assembled __________ Reviewed By (W) Eng.: ______________ Date: __________

Turbine Bearings

Bearings

The HP bearings (T-1 and T-2), the LP A bearings (T-5 and T-6), and the generator bearings (T-9 and T-10) were all inspected as part of the rotor change-outs for each section. After seeing the poor condition that the bearings were in, the decision was made to inspect all of the other bearings as well. A description of the work done on the bearings is listed below.

HP Bearings

The HP bearings are labeled T-1 and T-2 bearings. Both bearings are Westinghouse style tilt pad bearings, with 4 bearing pads and a babbitted seal ring on both the inboard and outboard sides of the bearings.

After initial disassembly, the bearings were inspected visually. Both bearings had Babbitt cracked out of the top bearing pads, and the seal rings were wiped. Both the T-1 and T-2 bearings and seal rings were sent to RPM for repairs without NDE inspection. The mandrels for the two bearings were also sent to RPM.

At RPM, the following work was performed:

On T-1:	The mandrel was turned down to the proper size. Minor Babbitt repairs were made to the bearing pads. New pucks were supplied by RPM to close up the bearing clearance to design clearance. Both babbitted oil seals were spin cast and bored to final size. The GE oil seal was thermal sprayed on the face to close up the axial clearance. The anti-rotation pin slot in the GE seal was damaged and was repaired.
On T-2:	The bearing pads were spin cast due to heavy damage on the babbitt surface. New pucks were supplied by RPM to close up the bearing clearance to design clearance. The dowels were loose and were replaced. The TE oil seal was puddle repaired and bored to final size. The GE oil seal was spin cast and bored to final size.

The bearings, mandrels, and seal rings were returned to site. The bearing ring pads were fit to the standards with at least 80% blue contact. The bearings were installed and the rotor was installed.

During coupling alignment, T-1 had to be moved by disassembling the bearing and machining the right side puck and shimming out the left side puck. T-2 bearing was moved by adjusting the bearing ring pads.

The upper halves of the bearings were installed and the clearance was checked and adjusted as necessary.

2nd Reheat Section Bearings

The 2nd Reheat bearings are labeled T-3 and T-4 bearings. Both bearings are Westinghouse style tilt pad bearings, with 4 bearing pads and a babbitted seal ring on both the inboard and outboard sides of the bearings. T-3 and T-4 bearings were inspected due to the poor condition of the HP and LP A bearings.

T-3 bearing was visually inspected and appeared to be suitable for reuse. The babbitted pads were checked for bond by CMS personnel using ultrasonic NDE techniques.

The bearing seal rings were wiped. The babbitted seal rings were sent to RPM for repairs. At RPM, the seal rings were spin cast and machined to the design size.

T-4 bearing was in good condition with the exception of two corners that were cracked out of one of the upper half bearing pads. The Babbitt bond of the bearing pads was NDE inspected by CMS personnel, and was acceptable throughout the pads. A CMS machinist did a puddle repair to the bearing pad that had the cracked out corners, and hand scraped the contour back into the pad.

The T-3 and T-4 bearings were reinstalled. The seal rings were installed and then the upper half of the bearings were assembled. The clearance of the bearings was checked and the pucks were shimmed where necessary.

LP "A" rotor bearings

The LP A bearings are labeled T-5 and T-6 bearings. Both bearings are elliptical style bearings. Both bearings are equipped for lift oil for use when the rotor is on turning gear and during roll up.

When disassembled, the T-5 and T-6 bearings were obviously wiped. Both bearings were sent to RPM for repairs without further inspections.

At RPM both bearings were spin cast and then bored to design clearance to the rotor journals.

The bearing ring pads were fit to the standards with a minimum of 80% contact. The lower bearing was installed, and the rotor was installed. The bearing was squared to the shaft and all twist and tilt measurements were taken. The upper bearings were installed, and the upper ring pad clearances were set.

When the oil system was put in service, the lift of the T-5 and T-6 bearings was checked. The lift pump needed to be changed out, as is discussed in the "lube oil system" section.

The flow regulator at the T-5 bearing had to be changed out, and the flow regulator at T-6 bearing was adjusted to provide acceptable lift at both bearings.

LP "B" rotor bearings

The LP B bearings are labeled T-7 and T-8 bearings. Both bearings are elliptical style bearings. Both bearings are equipped for lift oil for use when the rotor is on turning gear and during roll up.

When disassembled, the T-5 and T-6 bearings were obviously wiped. This led to the need to inspect T-7 and T-8 bearings even though the rotor was not being changed out. Both T-7 and T-8 bearings were rolled out. Both bearings were in good condition, but had a brown discoloration to them.

Both bearings were cleaned up by hand and then reinstalled. The bearing was squared to the shaft and all twist and tilt measurements were taken. The upper bearings were installed.

When the oil system was put in service, the lift of the T-7 and T-8 bearings was checked. The lift pump needed to be changed out, as is discussed in the "lube oil system" section. The flow regulator at the T-7 bearing had to be changed out. Acceptable lift was achieved at both bearings.

Generator Bearings

The generator bearings are labeled T-9 and T-10 bearings, and the collector assembly bearing is T-11. Both T-9 and T-10 bearings had to be repaired due to differences in the journal sizes between the running and spare rotors. See "Generator" section for the report and data sheets on the generator and collector assembly bearings.

Thrust Bearing

The thrust bearing for the main turbine is a Kingsbury style thrust bearing with tilting thrust pads and one seal oil ring on each side of the thrust bearing.

The thrust bearing was completely disassembled. All of the thrust bearing pads appeared to be in good condition. CMS personnel checked the Babbitt bonding of the pads and all were acceptable. The thrust pads were checked to a flat plate and were scraped until 90% contact was achieved.

The thrust bearing seal rings were inspected and compared to the shaft sizes of the spare HP rotor. Both seal rings had acceptable clearance, but the GE seal ring was significantly out of round. A spare seal ring was procured from Mitchell stores and was machined to size by Shuttlers machining. The TE seal ring was used as found.

The thrust bearing was assembled and the total rotor float was checked. The thrust shim had to be machined, and a final rotor float of 0.011" was accepted. The seal rings were then installed and had to be fit to the shaft with 0.003" clearance.

The thrust bearing was positioned so that the HP rotor was at its desired "L" position and the thrust cage was pushed hard against the GE thrust runner. The wedges were set under the direction of the Westinghouse service engineer.

Oil Deflectors

The oil deflectors for the HP rotor, LP "A" rotor, LP spool piece, turning gear, and generator were all disassembled and inspected as part of the turbine outage. All of the oil deflectors were cleaned up, assembled, and miced up. The rotor shafts were miced up and the clearance of the oil deflectors was calculated. Only 2 oil deflectors were out of desired specs.

T-2 and T-6 TE oil deflectors had excessive clearance and were sent to RPM to be retoothed. They were retoothed and then bored to their final size.

When the oil deflectors were reinstalled, they were all set with 0.006" clearance to the shaft on the bottom with even clearance on each side.

Please note: T-2 oil deflector is a rectangular oil deflector and can NOT be rolled out with the rotor in place. This oil deflector must be installed prior to setting the rotor.

Mitchell Unit 1 – Bearings

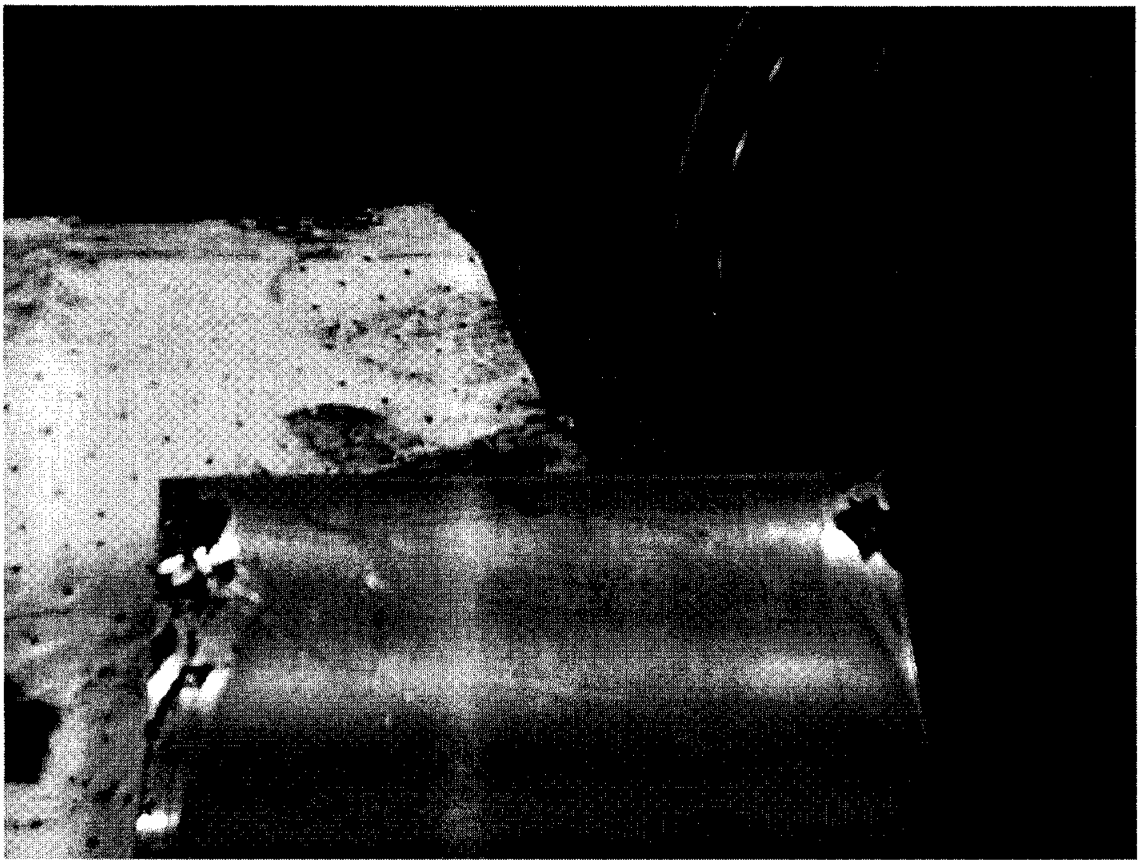
Fall 2001 Outage

Comments:

T-1 bearing was sent to RPM for repairs prior to inspection due to journal size differences between the running and spare rotors. One item noted by RPM was the damage to the anti-rotation pin slot for T-1 bearing's GE oil seal ring as shown above. This was repaired by RPM. The axial clearance of the seal ring was excessive and was repaired by thermal spraying.

Mitchell Unit 1 – Bearings

Fall 2001 Outage

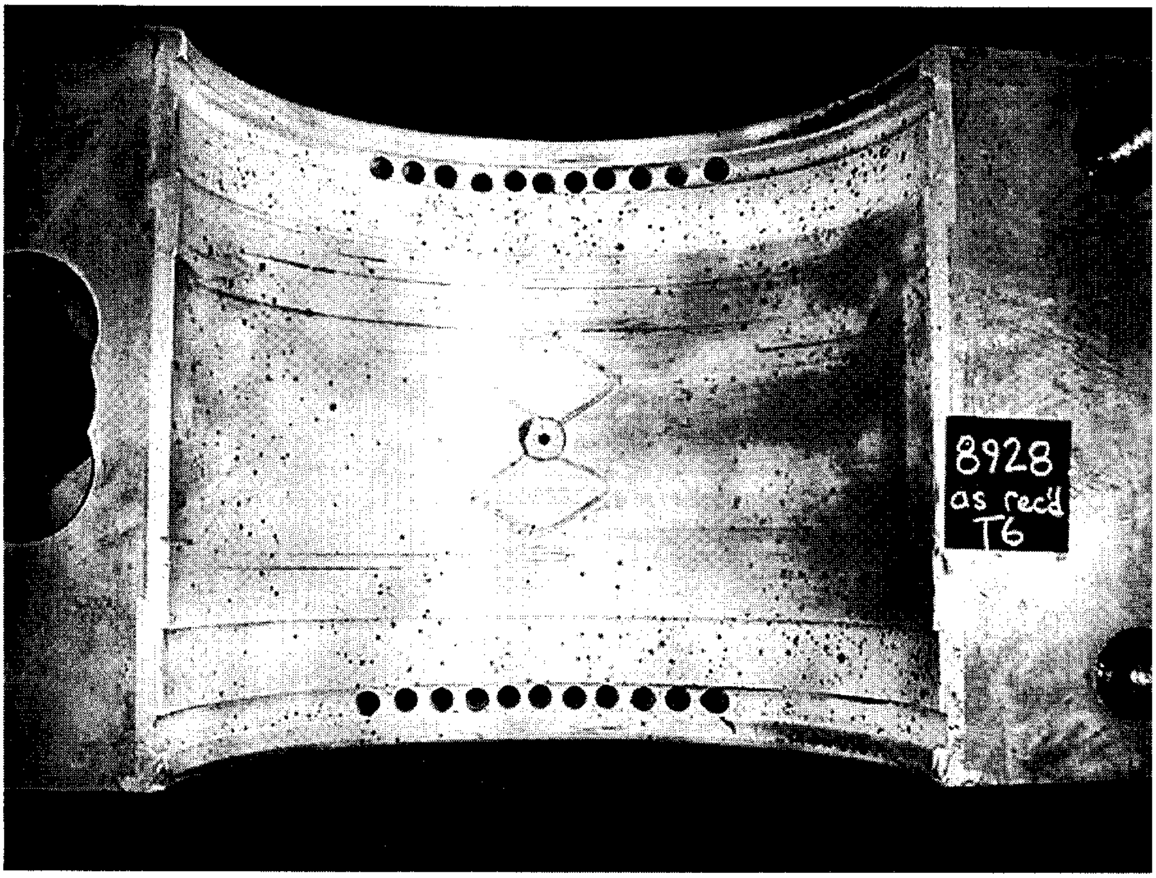


Comments:

This photo shows an upper pad from T-4 bearing. This bearing pad was puddle repaired on site by CMS personnel and hand scraped for contour.

Mitchell Unit 1 – Bearings

Fall 2001 Outage

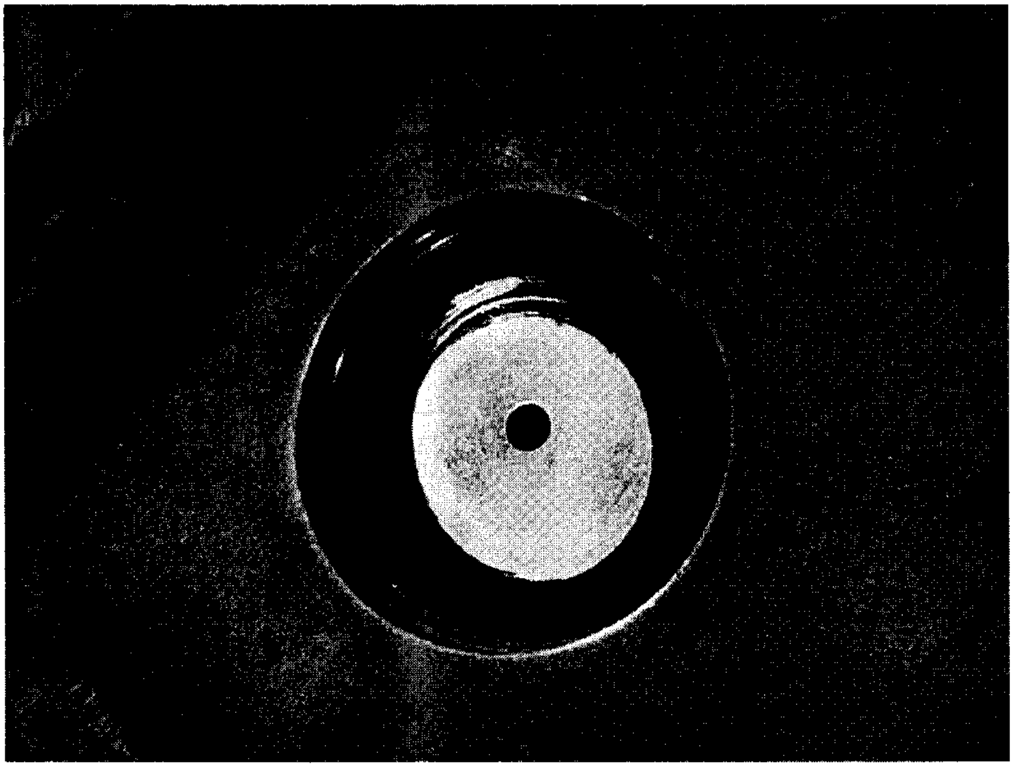


Comments:

T-6 bearing was found to be wiped. It was sent to RPM, cleaned up, and NDE inspected. This photo shows T-6 bearing as received at RPM. The bearing was spin cast for repairs. Note that T-5 bearing was found in a similar poor condition and was also spin cast repaired.

Mitchell Unit 1 – Bearings

Fall 2001 Outage



Comments:

T-2 bearing was sent to RPM for repairs prior to inspection due to journal size differences between the running and spare rotors. One item noted by RPM was the lack of contact between the conical puck and bearing housing as shown above. This was repaired by RPM.

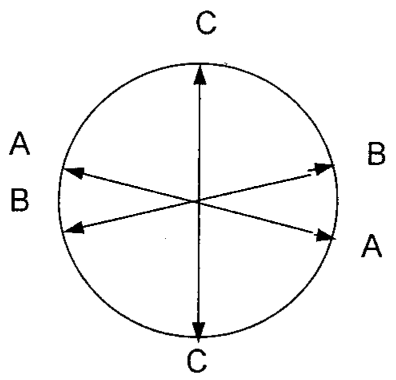
Journal Bearings

LP "A" Bearings

Date: 9/26/01 Turbine Serial No ML 1 Prepared by J. Brothers

INSPECTIONS & CHECKS		CODE	
Ball Contact Check	N	**X**	Work Carried Out
Ball Pinch Check	X	**N**	Not Done
Ball Torque Check	N	**NA**	Not Applicable
Twist & Tilt Check	X	**C**	See Comments
Journal Inspection	V	**V**	Visual Inspection
Babbit Inspection	UT	**MP**	Mag. Particle
Screens & Orifices	NA	**UT**	Ultrasonic
T/C Calib.	N	**PT**	Penetrant

Bearing No.	Bearing Type	Forward or Turbine End			Aft or Generator End			Journal Dia.	Clearance	
		A-Dia	B-Dia	C-Dia	A-Dia	B-Dia	C-Dia		Mils	Mils/In
T-5	Cyl	15.956	15.956	15.956	15.956	15.956	15.956	15.923	33	2.1
T-6	Cyl	16.984	16.984	16.984	16.984	16.984	16.984	16.948	36	2.1



Ball Seat Pinch Fits

Bearing Number	Pinch* Mils	Bearing Number	Pinch*
T-5	1.0		
T-6	1.0		

Comments:

Both T-5 and T-6 bearings were found wiped. The bearings were repaired by RPM.
Data above is final - after repairs data.
Westinghouse bearings have 2 mils per inch design clearance.

Journal Bearings

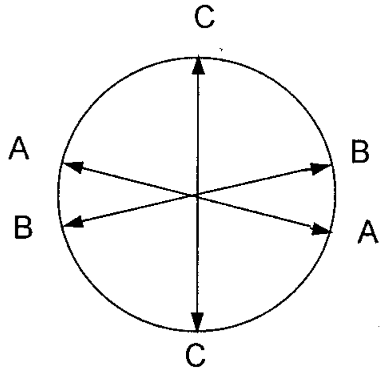
LP "B" Bearings

Date: 9/18/01 Turbine Serial No ML 1 Prepared by J. Brothers

INSPECTIONS & CHECKS		
Ball Contact Check	N	
Ball Pinch Check	X	
Ball Torque Check	N	
Twist & Tilt Check	X	
Journal Inspection	V	
Babbit Inspection	UT	
Screens & Orifices	NA	
T/C Calib.	N	

CODE	
X	Work Carried Out
N	Not Done
NA	Not Applicable
C	See Comments
V	Visual Inspection
MP	Mag. Particle
UT	Ultrasonic
PT	Penetrant

Bearing No.	Bearing Type	Forward or Turbine End			Aft or Generator End			Journal Dia.	Clearance	
		A-Dia	B-Dia	C-Dia	A-Dia	B-Dia	C-Dia		Mils	Mils/In
T-7	Cyl	15.853	15.853	15.855	15.854	15.853	15.855	15.816	39	2.5
T-8	Cyl	16.814	16.818	16.817	16.811	16.819	16.815	16.782	33	2.0



Ball Seat Pinch Fits

Bearing Number	Pinch* Mils	Bearing Number	Pinch*
T-7	1.0		
T-8	1.0		

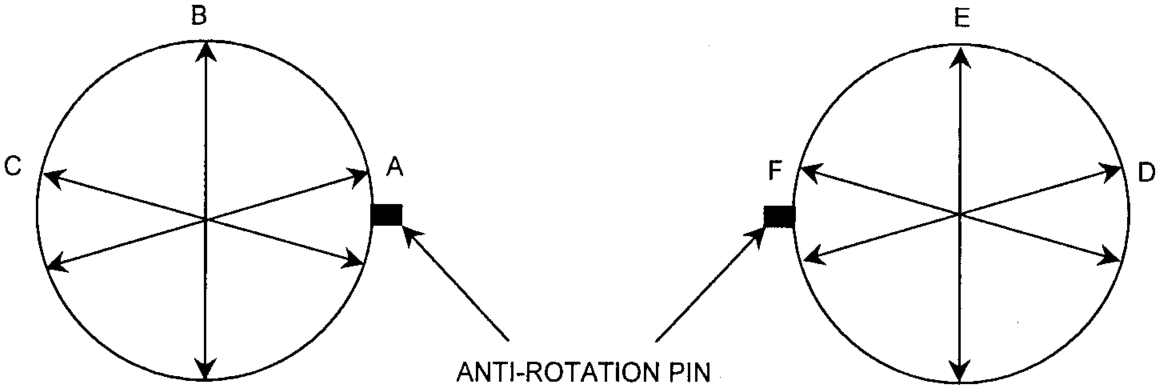
Comments:

Both T-7 and T-8 bearings were cleaned up and used as found.
Both bearings had a rust colored film on the babbitt. It was cleaned off by hand with scotch brite pads.
Westinghouse bearings have 2 mils per inch design clearance.

SIEMENS
WESTINGHOUSE

CUSTOMER: AEP	
LOCATION/UNIT #: MITCHELL 1	
HP BEARING SEAL RING	
BB/FRAME:	JOB NO.:
COMPONENT/S.O.: HP	DWG.:

Spare HP rotor # TD 35049



After rebabbitted bearing seal ring

BEARING NUMBER 1					
GOV SIDE		GEN END		CALCULATIONS	
POSITION	DIM.	POSITION	DIM.	AVG SHAFT O.D.	CLEARANCE
A	11.994	D		11.969	0.025
B	11.992	E		11.969	0.023
C	11.994	F		11.969	0.025

BEARING NUMBER 2					
GOV SIDE		GEN END		CALCULATIONS	
POSITION	DIM.	POSITION	DIM.	AVG SHAFT O.D.	CLEARANCE
A		D	11.994	11.969	0.025
B		E	11.995	11.969	0.026
C		F	11.993	11.969	0.024

Tool # Used ____________________ Cal. Due Date __________

As Found __________ Reading Taken By: _____DOWNING_______________ Date: _10/11/01____

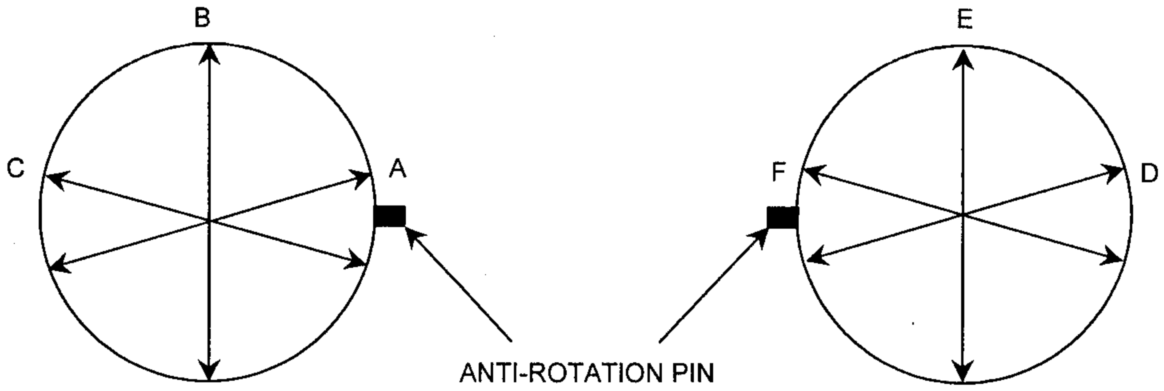
As Assembled ____X______ Reviewed By (W) Eng.: ______________________ Date: __________

SIEMENS
WESTINGHOUSE

CUSTOMER: AEP
LOCATION/UNIT #: MITCHELL 1

IP BEARING SEAL RING

BB/FRAME: JOB NO.:
COMPONENT/S.O.: IP DWG.:



After rebabbitted bearing seal ring

BEARING NUMBER 3					
GOV SIDE		GEN END		CALCULATIONS	
POSITION	DIM.	POSITION	DIM.	AVG SHAFT O.D.	CLEARANCE
A	14.001	D		13.970	0.031
B	13.997	E		13.970	0.027
C	14.002	F		13.970	0.032

BEARING NUMBER 3					
GOV SIDE		GEN END		CALCULATIONS	
POSITION	DIM.	POSITION	DIM.	AVG SHAFT O.D.	CLEARANCE
A		D	14.000	13.970	0.030
B		E	13.999	13.970	0.029
C		F	14.001	13.970	0.031

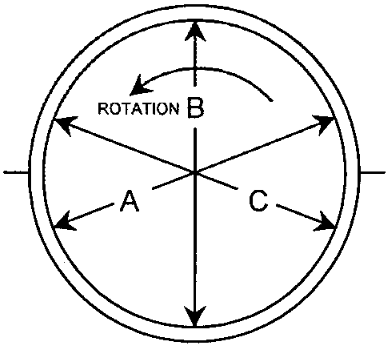
Tool # Used ______________________ Cal. Due Date __________

As Found __________ Reading Taken By: _____DOWNING______________ Date: _10/11/01____

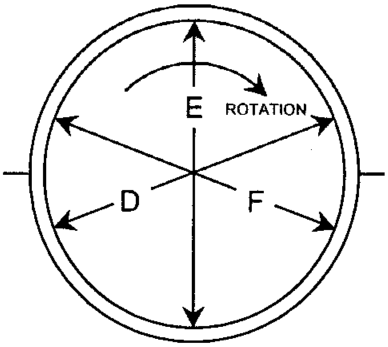
As Assembled ____X______ Reviewed By (W) Eng.: ______________________ Date: __________

SIEMENS
WESTINGHOUSE

CUSTOMER: AEP	
LOCATION/UNIT #: MITCHELL # 1	
BEARING DIMENSIONS	
BB/FRAME:	JOB NO.:
COMPONENT/S.O.: LP 1	DWG.:



GVN



GNN

LP1 spare rotor TD39437

	GOVERNOR END		GENERATOR END			
BRG NO.	POSITION	DIM.	POSITION	DIM.	AVERAGE SHAFT O.D.	AVE CLR
5	A	15.956	D	15.956	15.923	0.033
	B	15.956	E	15.956	15.923	0.033
	C	15.956	F	15.956	15.923	0.033
6	A	16.984	D	16.984	16.948	0.036
	B	16.984	E	16.984	16.948	0.036
	C	16.984	F	16.984	16.948	0.036

Dimensions were taken after rebabbitted bearing

FILE: MS042.PPT Rev. 01

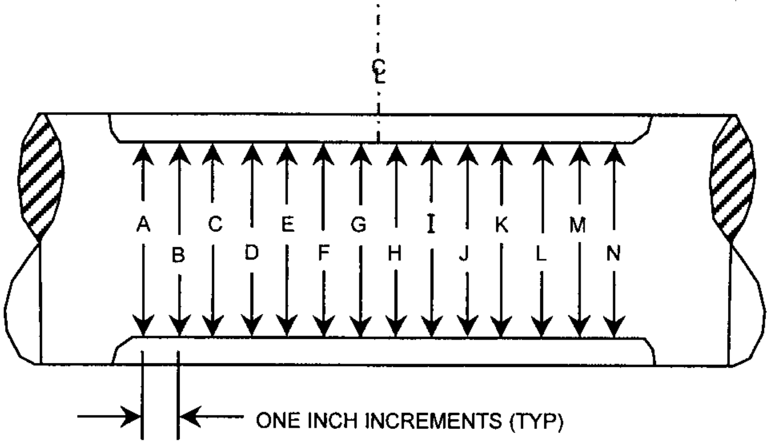
Tool # Used ______________________ Cal. Due Date __________

As Found __________ Reading Taken By: __J. Brothers_________ Date: ___9-26-01_____

As Assembled ____X______ Reviewed By (W) Eng.: __________________ Date: _______

SIEMENS
WESTINGHOUSE

CUSTOMER: AEP	
LOCATION/UNIT #: MITCHELL 1	
IP JOURNAL DIMENSIONS	
BB/FRAME:	JOB NO.:
COMPONENT/S.O.: IP ROTOR	DWG.:



NO. 3 BEARING			NO. BEARING		
POS.	0° DIM	90° DIM	POS.	0° DIM	90° DIM
A			A		
B			B		
C			C		
D			D		
E			E		
F	13.970		F		
G			G		
H			H		
I			I		
J			J		
K			K		
L			L		
M			M		
N			N		

Tool # Used ______________________ Cal. Due Date ________

As Found ____X______ Reading Taken By: ______________ Date: _9/18/01___

As Assembled ____X______ Reviewed By (W) Eng.: ______________________ Date: ________

Bearing To Journal Alignment
For Bearings With Ball Seats

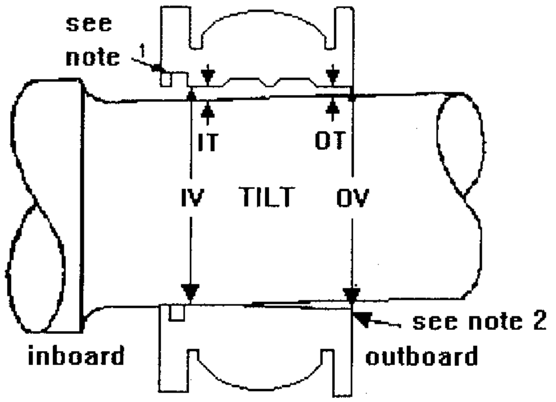
Plant & Unit ML 1

Prepared by J. Brothers / J. Foster

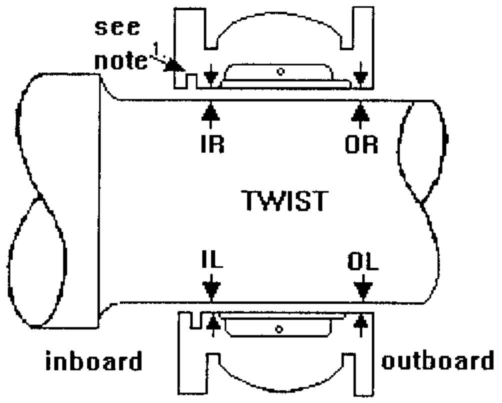
Date(m/d/y) 9/18/01

As Found / Final Data Final

Turbine S/N:



ELEVATION VIEW



PLAN VIEW

NOTES:
1. On most generator bearings, the end leakage groove is on the outboard end.
2. On hood bearings, the outboard end is set low to compensate for vacuum deflection.

Tilt

Brg #	Section	Reading in Inches IV	Reading in Inches OV	Reading in Mils IT	Reading in Mils OT	Limits 0.0 To	Actual (Mils)	Tolerance Check
T5	LP A	15.956"	15.956"	35 Mils	35 Mils	1.6 Mils	0.0 Mils	✓
T6	LP A	16.984"	16.984"	35 Mils	35 Mils	1.7 Mils	0.0 Mils	✓
T7	LP B	15.855"	15.855"	38 Mils	38 Mils	1.6 Mils	0.0 Mils	✓
T8	LP B	16.815"	16.817"	36 Mils	37 Mils	1.7 Mils	1.0 Mils	✓

Twist

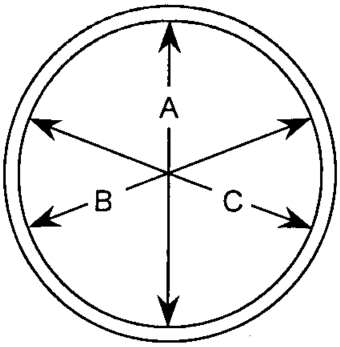
Brg #	Section	Readings in Mils IL	OL	IR	OR	Limits	Actual	Tolerance Check
T5	LP A	12 Mils	14 Mils	14 Mils	12 Mils	±4.8 Mils	2.0 Mils	✓
T6	LP A	15 Mils	17 Mils	18 Mils	16 Mils	±5.1 Mils	2.0 Mils	✓
T7	LP B	12 Mils	12 Mils	14 Mils	15 Mils	±4.8 Mils	-0.5 Mils	✓
T8	LP B	13 Mils	12 Mils	19 Mils	11 Mils	±5.0 Mils	3.5 Mils	✓

SIEMENS
WESTINGHOUSE

CUSTOMER: AEP
LOCATION/UNIT #: MITCHELL 1

THRUST CAGE OIL SEAL CLEARANCE

BB/FRAME: JOB NO.:
COMPONENT/S.O.: DWG.:



Spare rotor TD35049
Thrust collar thickness = ____________

	AXIAL CLR			DIAMETRIC CLEARANCE				
SEAL	Groove Width	Ring Thickness	axial clr.	A	B	C	SHAFT DIA.	AVE CLR
GOV END	0.626	0.623	0.003	14.000	14.000	14.000	13.999	0.001
GEN END	0.626	0.623	0.003	14.000	14.000	13.998	13.998	0.001

Note: Shaft data is for spare rotor.

Gov end ring was scraped to get clearance. Gen end is new ring.

FILE: MS004.PPT Rev. 01

Tool # Used ____________________ Cal. Due Date __________

As Found __________ Reading Taken By: _Day & Night____________ Date: _9/24/01____

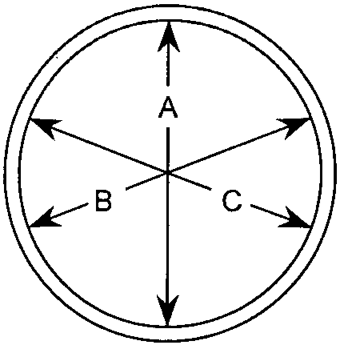
As Assembled ____X______ Reviewed By (W) Eng.: __________________ Date: _________

SIEMENS
WESTINGHOUSE

CUSTOMER: AEP
LOCATION/UNIT #: MITCHELL 1

THRUST CAGE OIL SEAL CLEARANCE

BB/FRAME: JOB NO.:
COMPONENT/S.O.: DWG.:



Spare rotor TD35049
Thrust collar thickness = ____________

	AXIAL CLR			DIAMETRIC CLEARANCE				
SEAL	Groove Width	Ring Thickness	axial clr.	A	B	C	SHAFT DIA.	AVE CLR
GOV END	0.626	0.623	0.003	13.999	13.998	13.998	13.999	-0.001
GEN END	0.626	0.623	0.003	14.004	13.999	13.998	13.998	0.002

Note: Shaft data is for spare rotor.

Tool # Used ____________________ Cal. Due Date ________

As Found _____X_____ Reading Taken By: _Day & Night______________ Date: _9/24/01____

As Assembled __________ Reviewed By (W) Eng.: ____________________ Date: ________

FILE: MS004.PPT Rev. 01

Oil Deflector Clearances

Turbine Oil Deflectors

Plant & Unit ML 1

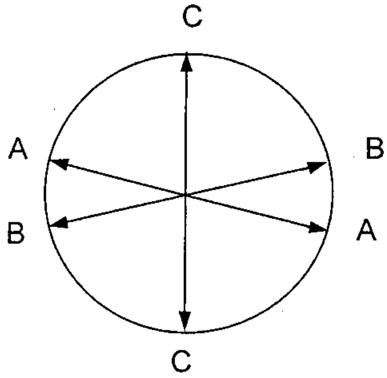
Prepared by D. Bordenkircher

Date(m/d/y) 9/26/01

As Found / Final Data Final

Turbine S/N:

INSPECTIONS & CHECKS				CODE	
Teeth Inspected	X			**X**	Work Carried Out
Journals Inspected	X			**N**	Not Done
				NA	Not Applicable
				C	See Comments
				V	Visual Inspection
				MP	Mag. Particle
				UT	Ultrasonic
				PT	Penetrant



Number	Location	Oil Deflector A-Dia	B-Dia	C-Dia	Journal Dia	Clearance Average	Min.	Max.	Condition Comment
T-1	HP - TE	13.510	13.503	13.518	13.453	0.057	0.050	0.065	Used as found
T-2	HP - GE	15.481	15.481	15.481	15.441	0.040	0.040	0.040	After Repairs
T-3	IP - TE	NT	NT	NT		0.029			By feeler gauge
T-4	IP - GE	17.494	17.496	17.503	17.457	0.041	0.037	0.046	Used as found
T-5	LP A - TE	17.493	17.491	17.496	17.457	0.036	0.034	0.039	Used as found
T-6 TE	LP A - GE	19.475	19.475	19.474	19.434	0.041	0.040	0.041	After Repairs
T-6 GE	JS - TE	17.487	17.485	17.498	17.438	0.052	0.047	0.060	Used as found
T-7 TE	JS - GE	17.492	17.490	17.491	17.430	0.061	0.060	0.062	Used as found
T-7 GE	LP B - TE	17.492	17.491	17.510	17.456	0.042	0.035	0.054	Used as found

Comments:

All repairs done by RPM.

Design Clearances: T-1, T-2, T-3, T-4, T-5, T-6 TE, T-7 GE = 0.040" / T-6 GE, T-7 TE = 0.060"

Oil Deflector Clearances

Turbine Oil Deflectors

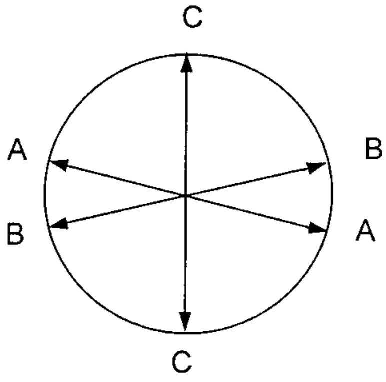
Plant & Unit ML 1

Prepared by D. Bordenkircher

Date(m/d/y) 9/17/01 As Found / Final Data As Found

Turbine S/N:

INSPECTIONS & CHECKS				CODE	
Teeth Inspected	X			**X**	Work Carried Out
Journals Inspected	X			**N**	Not Done
				NA	Not Applicable
				C	See Comments
				V	Visual Inspection
				MP	Mag. Particle
				UT	Ultrasonic
				PT	Penetrant



Number	Location	Oil Deflector			Journal Dia	Clearance			Condition Comment
		A-Dia	B-Dia	C-Dia		Average	Min.	Max.	
T-1	HP - TE	13.510	13.503	13.518	13.453	0.057	0.050	0.065	OK for reuse
T-2	HP - GE	15.514	15.530	15.545	15.441	0.089	0.073	0.104	Sent out for repairs
T-3	IP - TE	NT	NT	NT		0.029			By feeler gauge
T-4	IP - GE	17.494	17.496	17.503	17.457	0.041	0.037	0.046	OK for reuse
T-5	LP A - TE	17.493	17.491	17.496	17.457	0.036	0.034	0.039	OK for reuse
T-6 TE	LP A - GE	19.506	19.512	19.524	19.434	0.080	0.072	0.090	Sent out for repairs
T-6 GE	JS - TE	17.487	17.485	17.498	17.438	0.052	0.047	0.060	OK for reuse
T-7 TE	JS - GE	17.492	17.490	17.491	17.430	0.061	0.060	0.062	OK for reuse
T-7 GE	LP B - TE	17.492	17.491	17.510	17.456	0.042	0.035	0.054	OK for reuse

Comments:

T-2 & T-6 TE oil deflectors were sent to RPM for repairs.

Design Clearances: T-1, T-2, T-3, T-4, T-5, T-6 TE, T-7 GE = 0.040" / T-6 GE, T-7 TE = 0.060"

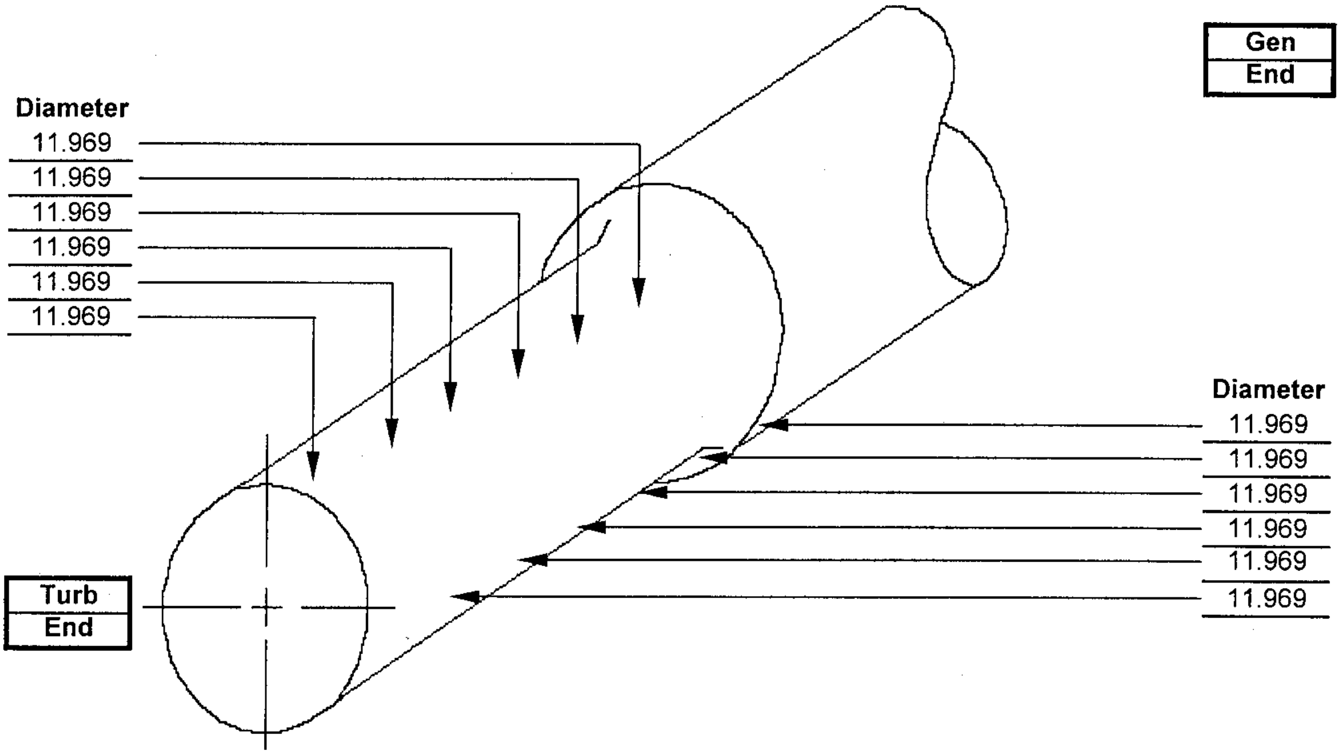
Rotor Journal Condition

Plant: ML
Unit 1
Turbine Serial No.

Date: Preoutage
As Found/Final Final
Prepared by J. Brothers

Journal Number T-1

Note: Mark on sketch to show grooving, discoloration, carbon inclusions, or irregularities in the journal surface.



Journal Sizes

	0°	90°	All
Maximum	11.9690	11.9690	11.9690
Minimum	11.9690	11.9690	11.9690
Difference	0.0000	0.0000	0.0000
Average	11.9690	11.9690	11.9690

Out of Roundness

Diameters		Out of Round
0°	90°	
11.9690	11.9690	0.0
11.9690	11.9690	0.0
11.9690	11.9690	0.0
11.9690	11.9690	0.0
11.9690	11.9690	0.0
11.9690	11.9690	0.0

Comments:

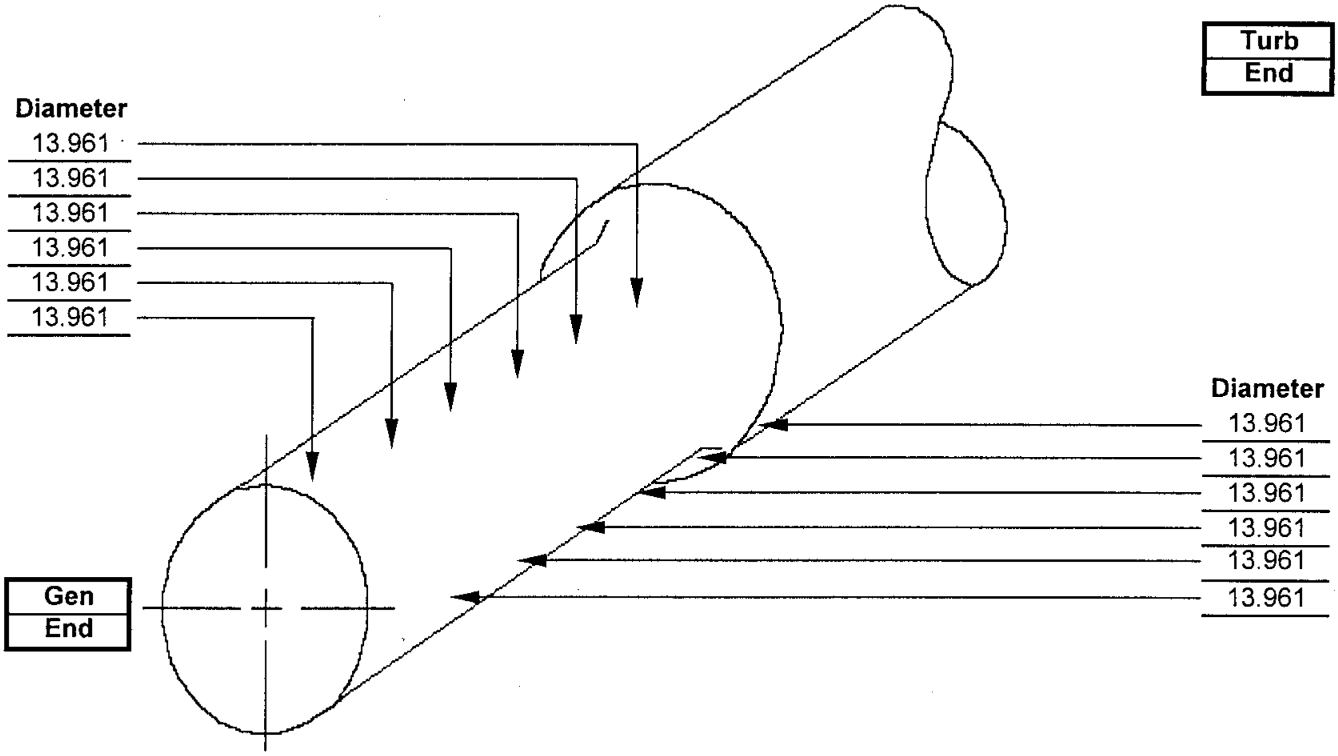
Rotor Journal Condition

Plant: ML　Unit 1　Turbine Serial No.

Date: Preoutage　As Found/Final Final　Prepared by J. Brothers

Journal Number T-2

Note: Mark on sketch to show grooving, discoloration, carbon inclusions, or irregularities in the journal surface.



Out of Roundness

Diameters 0°	Diameters 90°	Out of Round
13.9610	13.9610	0.0
13.9610	13.9610	0.0
13.9610	13.9610	0.0
13.9610	13.9610	0.0
13.9610	13.9610	0.0
13.9610	13.9610	0.0

Journal Sizes

	0°	90°	All
Maximum	13.9610	13.9610	13.9610
Minimum	13.9610	13.9610	13.9610
Difference	0.0000	0.0000	0.0000
Average	13.9610	13.9610	13.9610

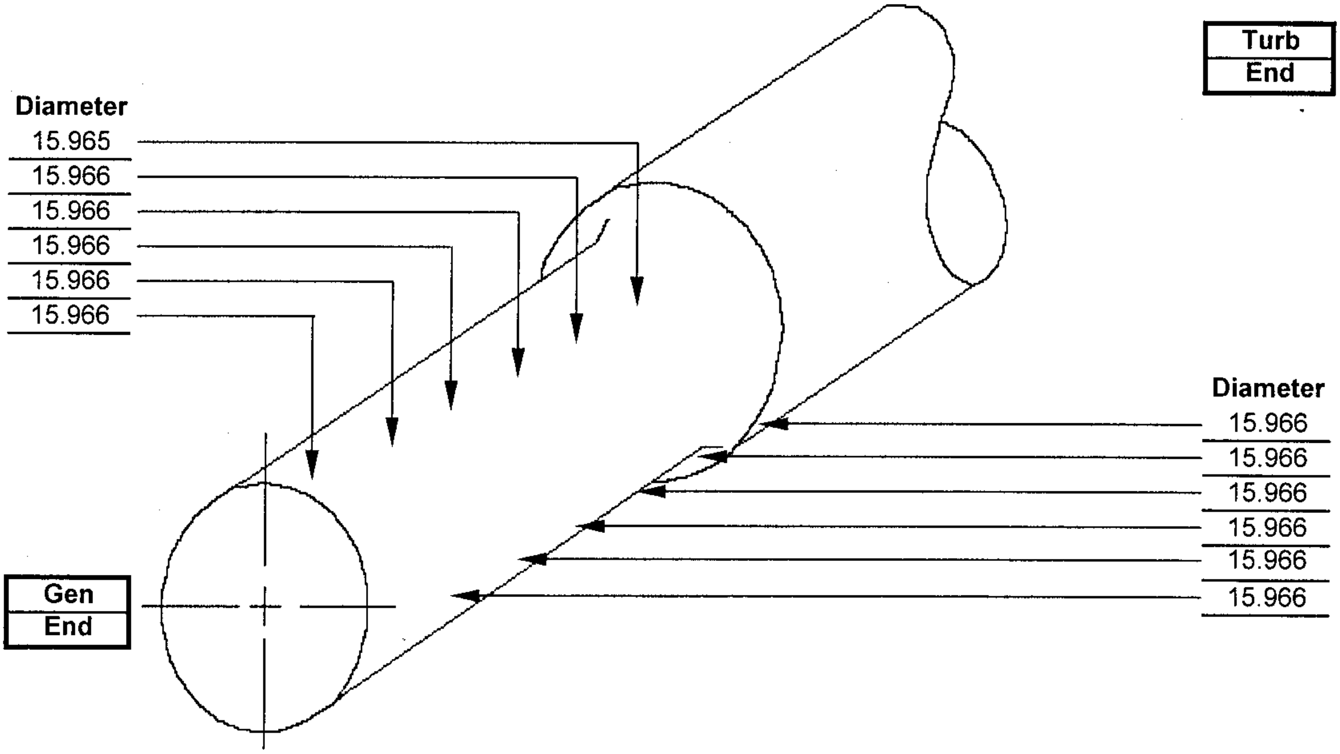
Comments:

Rotor Journal Condition

Plant: ML
Unit 1
Turbine Serial No.
Date: 9/20/01
As Found/Final Final
Prepared by T. Fankhauser

Journal Number T-4

Note: Mark on sketch to show grooving, discoloration, carbon inclusions, or irregularities in the journal surface.



Out of Roundness

Diameters 0°	Diameters 90°	Out of Round
15.9650	15.9660	1.0
15.9660	15.9660	0.0
15.9660	15.9660	0.0
15.9660	15.9660	0.0
15.9660	15.9660	0.0
15.9660	15.9660	0.0

Journal Sizes

	0°	90°	All
Maximum	15.9660	15.9660	15.9660
Minimum	15.9650	15.9660	15.9650
Difference	0.0010	0.0000	0.0010
Average	15.9658	15.9660	15.9659

Comments:

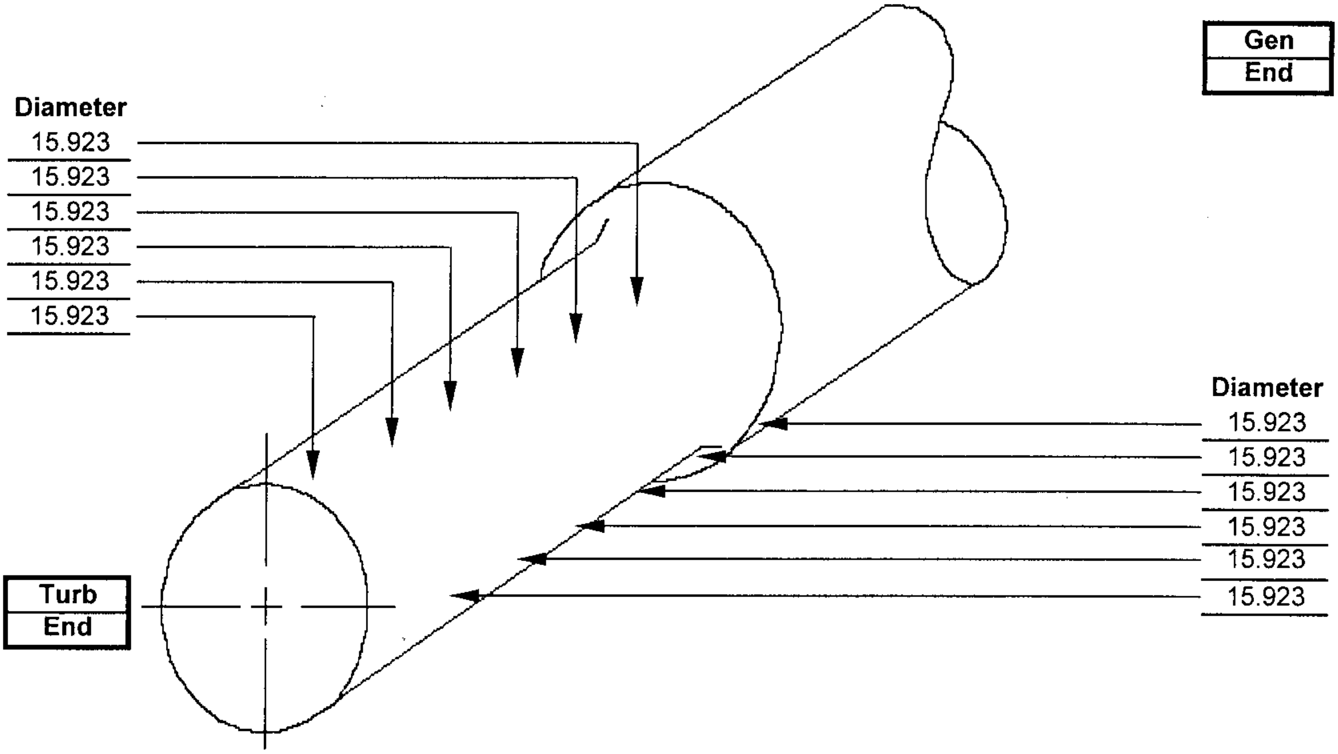
Rotor Journal Condition

Plant: ML   Unit 1   Turbine Serial No.

Date: Preoutage   As Found/Final Final   Prepared by J. Brothers

Journal Number T-5

Note: Mark on sketch to show grooving, discoloration, carbon inclusions, or irregularities in the journal surface.



Journal Sizes

	0°	90°	All
Maximum	15.9230	15.9230	15.9230
Minimum	15.9230	15.9230	15.9230
Difference	0.0000	0.0000	0.0000
Average	15.9230	15.9230	15.9230

Out of Roundness

Diameters		Out of Round
0°	90°	
15.9230	15.9230	0.0
15.9230	15.9230	0.0
15.9230	15.9230	0.0
15.9230	15.9230	0.0
15.9230	15.9230	0.0
15.9230	15.9230	0.0

Comments:

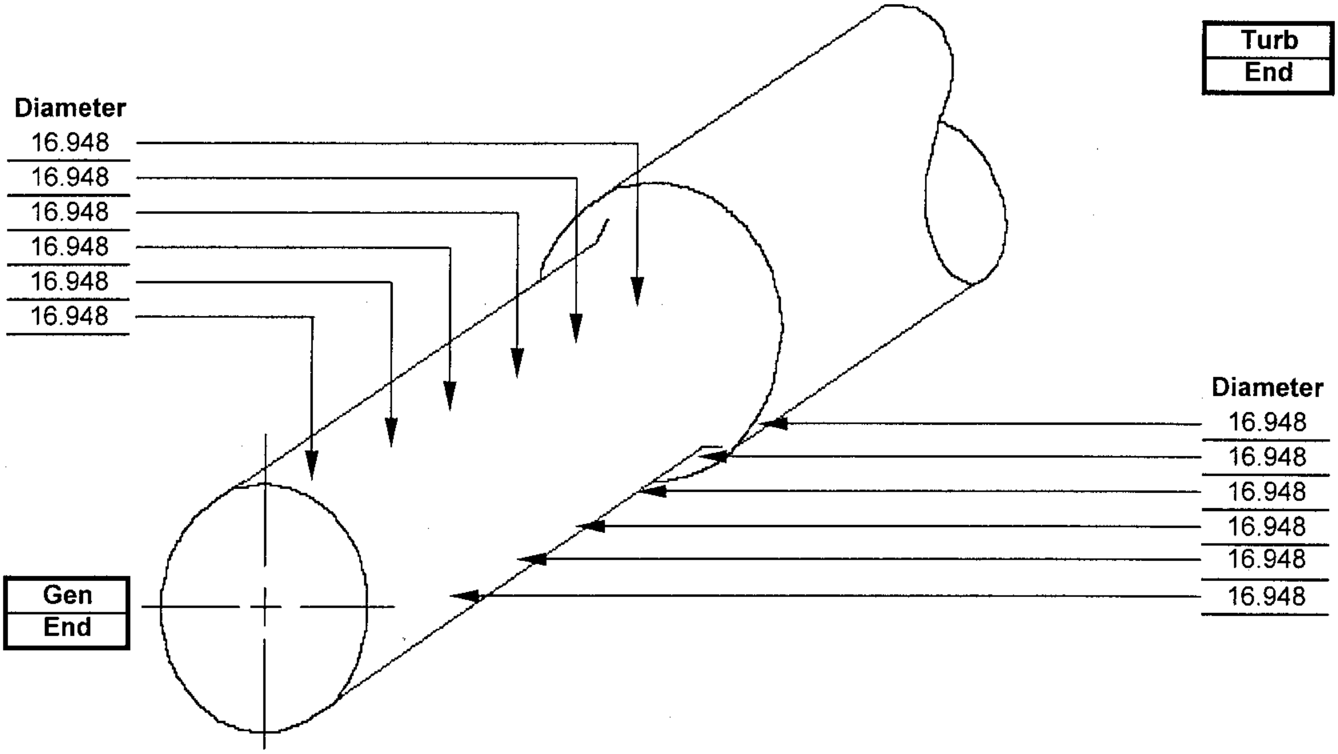
Rotor Journal Condition

Plant: ML Unit 1 Turbine Serial No. __________

Date: Preoutage As Found/Final Final Prepared by J. Brothers

Journal Number T-6

Note: Mark on sketch to show grooving, discoloration, carbon inclusions, or irregularities in the journal surface.



Journal Sizes

	0°	90°	All
Maximum	16.9480	16.9480	16.9480
Minimum	16.9480	16.9480	16.9480
Difference	0.0000	0.0000	0.0000
Average	16.9480	16.9480	16.9480

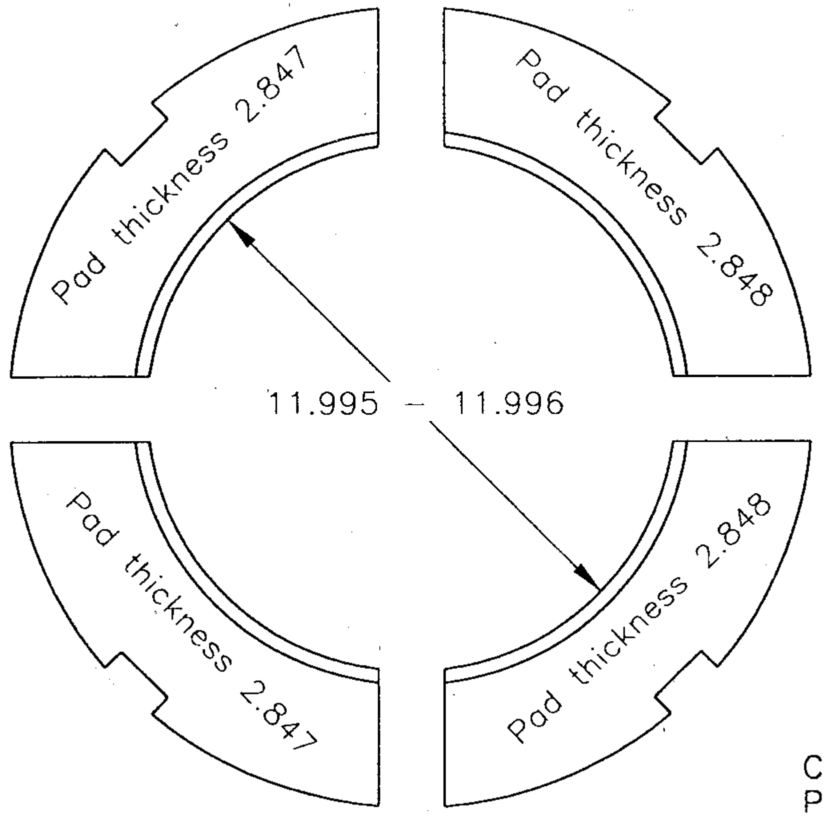
Out of Roundness

Diameters		Out of Round
0°	90°	
16.9480	16.9480	0.0
16.9480	16.9480	0.0
16.9480	16.9480	0.0
16.9480	16.9480	0.0
16.9480	16.9480	0.0
16.9480	16.9480	0.0

Comments:

RPM
RENEWAL PARTS MAINTENANCE, INC.
4485 Glenbrook Road • P.O. Box 1030 • Willoughby, Ohio 44096-1030

Job 8931/33



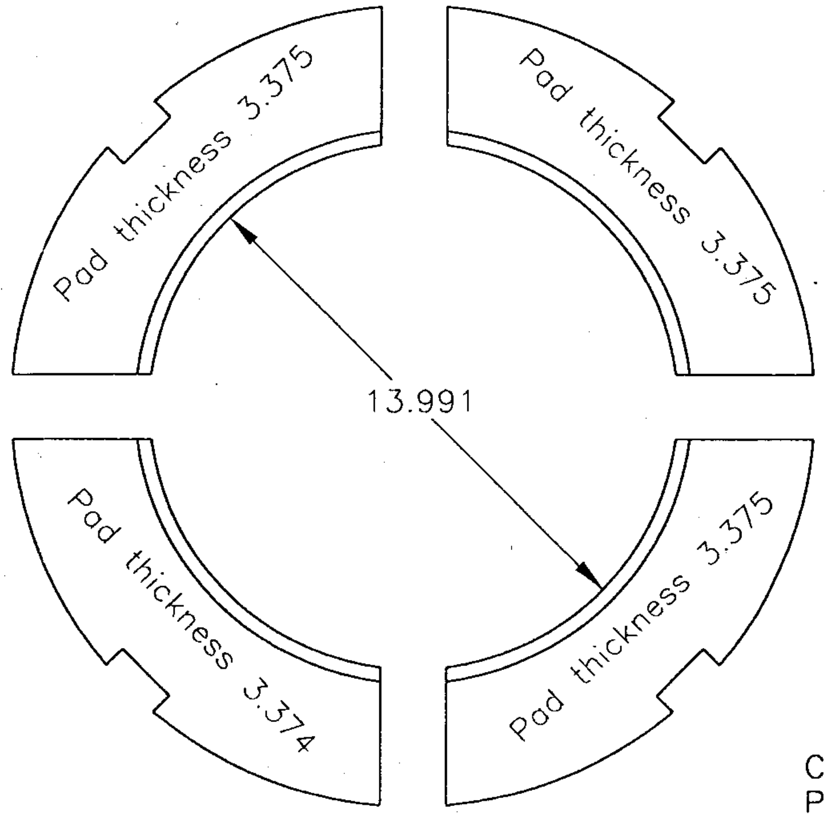
Babbitted oil seals

Gov	11.994
Gen	11.994

Customer: AEP
Plant: Mitchell Unit 1
Bearing number: 1
Workscope: Spin cast and bore
Babbitt bond > 95% via UT/P
Shipped date: 9/9/01

RPM
RENEWAL PARTS MAINTENANCE, INC.
4485 Glenbrook Road • P.O. Box 1030 • Willoughby, Ohio 44096-1030

Job 8932/33



Customer: AEP
Plant: Mitchell Unit 1
Bearing number: 2
Workscope: Spin cast and bore
Babbitt bond > 95% via UT/PT
Shipped date: 9/9/01

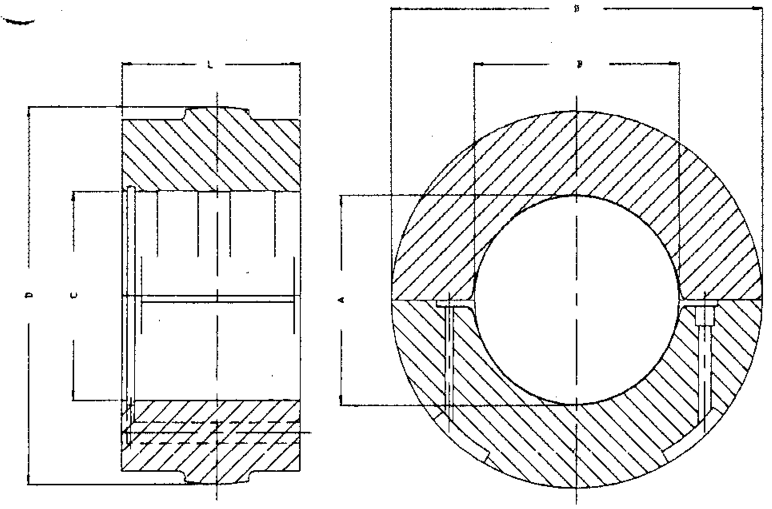
Babbitted oil seals

Gov	13.990
Gen	13.990

Renewal Parts Maintenance, Inc.

Inspection Report
Journal Bearing

RPM Job # 8927



Customer: American Electric Power

Plant/Unit: Mitchell Plant #1

OEM/Design: Cylindrical

Comments:

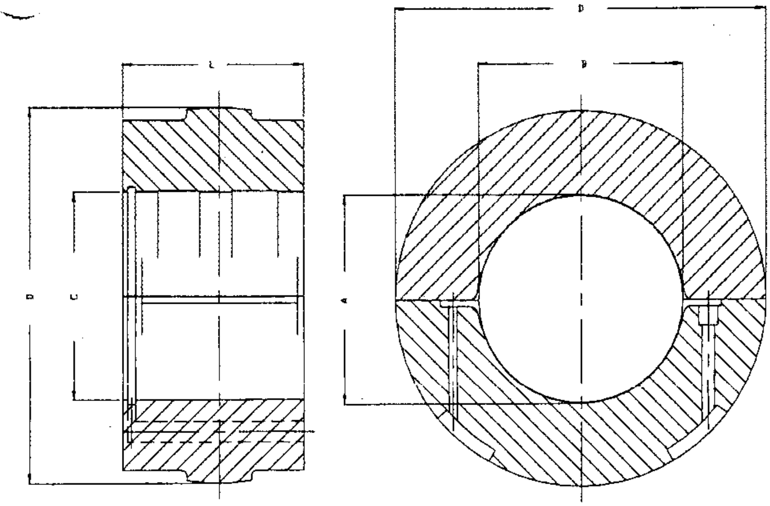
Work Scope: Centrifugal Cast Repair

P/N T5 Design Cylindrical		As Received Date: 9/14/01			As Shipped Date: 9/25/01		
		Vert	Horz	Horz	Vert	Horz	Horz
Inside Diameter	Inboard	15.975	15.968	15.973	15.9557	15.9558	15.9557
	Midboard						
	Outboard	15.975	15.968	15.973	15.9557	15.9557	15.9558
Seal Diameter	Inboard	15.978	15.969	15.976	15.956	15.9562	15.9561
	Outboard	15.980	15.969	15.972	15.956	15.9561	15.9562
Outside Diameter	Inboard	22.960	22.958	22.962	22.935	22.935	22.935
	Midboard						
	Outboard	22.970	22.950	22.966	22.940	22.940	22.940
Length		Babbitt 15.955			Babbitt 15.935		
Joints		In .005 / Out .002			In .000 / Out .001 Contact 75%		
Dowels		(2) Condition Fair			(2) 1" Mfg New		
Babbitt Bond		Not Recorded			UT/PT>95% Adhesion		

RPM Renewal Parts Maintenance, Inc.

Inspection Report
Journal Bearing

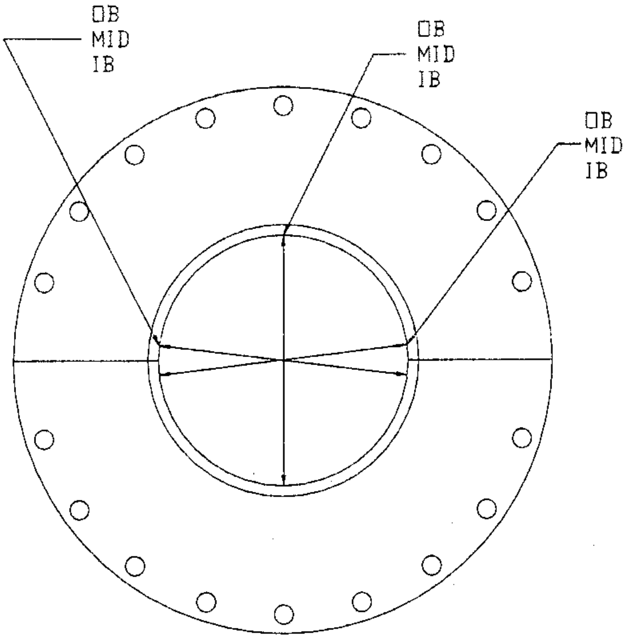
RPM Job # 8928



Customer: American Electric Power				Plant/Unit: Mitchell Plant #1			
OEM/Design: Cylindrical				Comments:			
Work Scope: Centrifugal Cast Repair							
P/N T6 Design Cylindrical		As Received Date: 9/14/01			As Shipped Date: 9/25/01		
		Vert	Horz	Horz	Vert	Horz	Horz
Inside Diameter	Inboard	16.855	16.845	16.843	16.9828	16.9828	16.9827
	Midboard						
	Outboard	16.857	16.846	16.845	16.9829	16.9827	16.9828
Seal Diameter	Inboard	16.858	16.848	16.846	16.9832	16.9832	16.9833
	Outboard	16.860	16.846	16.847	16.9833	16.9832	16.9833
Outside Diameter	Inboard	28.464	28.460	28.462	28.440	28.440	28.440
	Midboard						
	Outboard	28.472	28.460	28.464	28.445	28.445	28.445
Length		OAL 16.986			Babbitt 16.940		
Joints		In .007 / Out .003 Contact 35%			In .000 / Out .001 Contact 60%		
Dowels		(2) 1" Condition Good			(2) 1" As Is		
Babbitt Bond		Not Recorded			UT/PT>95% Adhesion		

RPM Renewal Parts Maintenance, Inc.

Inspection Report
Oil Deflector
RPM Job # 8961

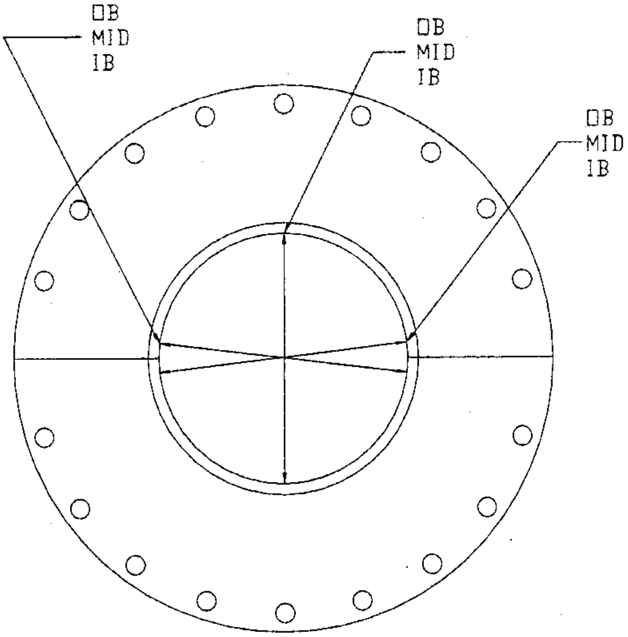


Customer: American Electric Power				Plant/Unit: Mitchell #1			
Work Scope: Provide/Install New Teeth				No. Teeth/style: 4 Teeth, Insert, Aluminum			
Comments: Provide and install new teeth							
P/N T2		As Received Date: 9/19/01			As Shipped Date: 9/25/01		
OEM Cylindrical		Vert	Horz	Horz	Vert	Horz	Horz
Inside Diameter	Inboard	15.5			15.481	15.481	15.481
	Midboard						
	Outboard				15.481	15.481	15.481
Warpage		.004			No Change		
Joints		In .012 / Out .009			In .000 / Out .001		
Dowels		½" Condition Good			No Change		

"100% Customer Satisfaction is always our goal."

RPM *Renewal Parts Maintenance, Inc.*

Inspection Report
Oil Deflector
RPM Job # 8961



Customer: American Electric Power				Plant/Unit: Mitchell #1			
Work Scope: Provide/Install New Teeth				No. Teeth/style: 4 Teeth, Insert, Aluminum			
Comments: Provide and install new teeth							
P/N T6		As Received Date: 9/19/01			As Shipped Date: 9/25/01		
OEM Cylindrical		Vert	Horz	Horz	Vert	Horz	Horz
Inside Diameter	Inboard	19.5			19.474	19.474	19.474
	Midboard						
	Outboard				19.474	19.474	19.474
Warpage		.028			.005		
Joints		In .004 / Out .002			In .001 / Out .000		
Dowels		½" Condition Good			No Change		

"100% Customer Satisfaction is always our goal."
If you have any questions concerning this report or any of our services, please call us.
4485 Glenbrook Road • Willoughby, Ohio 44094 • 800.446.4776 • fax 440.946.5524

LP "A" Turbine

Rotor

Opening clearances and position checks were taken on the running LP "A" rotor, S/N TD35045 and then the rotor was removed. This rotor was loaded onto a shipping skid on a rail car, and had not been shipped from the plant at time of this report. The rotor should be shipped to CMS for future repairs.

The T-6 bearing was removed and the spare rotor, S/N TD35437, was installed. V-blocks and a jack were used to support the rotor at T-6 journal. Compatibility clearances were then taken on the rotor. Please note that rotor floats could not be done because of the way that T-6 journal was supported. All clearances between the new rotor and old blade rings were acceptable.

There is a difference in the bolt hole sizes for "C" coupling when using this rotor, so the spare jack shaft that goes between the 2nd reheat rotor and LP "A" rotor was used. The rabbet fits for "B", "C", "D", and "E" couplings were measured and had proper interference. All of the coupling bolts for "B", "C", "D", and "E" couplings were inspected and miced for clearance. All of the coupling bolts were NDE inspected and were suitable for reuse.

After all of the blade rings were installed and aligned, the rotor was reinstalled. The rotor was set on "K" and closing clearances were taken. The rotor turned freely at this position and had acceptable float in both directions.

The 2nd reheat rotor, LP "A" and LP "B" rotors were all set at their outside "L" positions and the gaps between the couplings were checked. The spacers for "C" and "E" couplings were machined to provide for these positions.

To align the couplings, the 2nd reheat rotor was moved, T-5 bearing needed a minor move, and the jackshaft between LP "A" and LP "B" rotor was aligned. See section on alignment.

Inlet Flow Guide and Blade Rings

The inlet flow guide was removed. It was blast cleaned and NDE inspected. No damage was noted and the flow guide was used as found.

LP rows 1 and 2 TE and GE are in separate blade carriers. These blade rings were removed and sent to CMS for inspection and repairs. At CMS, the blade rings were blast cleaned, NDE inspected, and had minor blade repairs done to them. The seal strips were all replaced with spare strips provided by STAR.

LP rows 3 and 4, TE and GE are integral to the LP inner casing. The packing was removed from the lower halves, and the blade rings were blasted and NDE inspected in place. CMS personnel did some minor blade repairs, replaced the sealing strips and hand ground the new sealing strips to the proper size.

The packing was removed from the upper half blade rings. One of the corners for the packing pin holes was damaged during removal of the packing pins. The blade rings were blasted and NDE inspected. A CMS welder repaired the packing pin hole and then made minor repairs to the blading. The seal strips were replaced and hand ground to size by CMS personnel.

The lower blade rings and flow guide were installed. All were set to benchmarks taken prior to their removal. This was done in lieu of tightwire alignment. All of the packing was installed, and the rotor was installed.

The outer packing glands were unbolted and removed to change out the steel gaskets. The packing glands were aligned to the rotor when reinstalled. Note that there was a bad steam cut on the horizontal joint of the upper Number 5 gland casing. The steam cut was weld repaired and hand scraped to a straight edge.

The upper blade carriers and inner shell were then installed. The rotor turned freely after installation. All bolting was torqued to Westinghouse design specifications.

Packing and Sealing Strips

The packing and sealing strips were all replaced with new packing and seals provided by STAR. Prior to the outage, personnel from STAR arrived on site and took measurements on the spare LP "A" rotor in order to calculate the desired tooth height of the new packing and seal strips. After all of the opening and compatibility clearances were completed, the old packing was removed from their blade rings and gland seals.

As discussed above. the new seal strips were installed hand ground by hand by CMS personnel. The new packing was installed by STAR personnel. The packing butts were cut by STAR personnel on site.

After the rotor was installed, closing clearances were taken. Closing clearances showed that the seal strips were too tight on three stages. The rotor was removed and seal strips were hand scraped for the three stages. The rotor was reinstalled and the clearances were acceptable. All closing clearances are included with this report.

Inner Casing

There are two inner casings for LP "A", plus a transition piece and a seal plate for the crossover flange.

During disassembly, all of the access covers for the inner shell bolting were removed. The gaskets for these covers, plus the gaskets for the transition pieces were assumed to be asbestos and were abated.

Both inner casings were blast cleaned and NDE inspected. Both inner shells were in good condition. Repairs were made to some of the bolt holes for the access covers.

The transition piece and the crossover seal plate were both sent to CMS and modified to accept a flexitallic gasket rather than a soft metal gasket.

A modification was done to the inner casing flow guide bolting. The bolt holes were enlarged, and new bolts with special locking rings were installed. The purpose of this modification was to allow the bolts to be checked ultrasonically during future last stage blade inspections.

A number of inner casing studs were replaced with spare parts. After the inner casings were reinstalled, all bolting was stretched to OEM specifications. Note that there is specialty tooling on site necessary for removing the inner casing pocket bolting.

Exhaust Hood and Crossover Piping

The expansion joint covers were removed and the expansion joints were removed. The exhaust hood was unbolted and removed.

Inspection of the expansion joints showed that both expansion joints needed to be replaced. A large number of the expansion joint bolts were in poor condition and were replaced. Only a few of the expansion joint covers were cracked. These were weld repaired.

The exhaust hood spray nozzles were all tested. Two of the spray nozzles were not functioning properly and were replaced with spares.

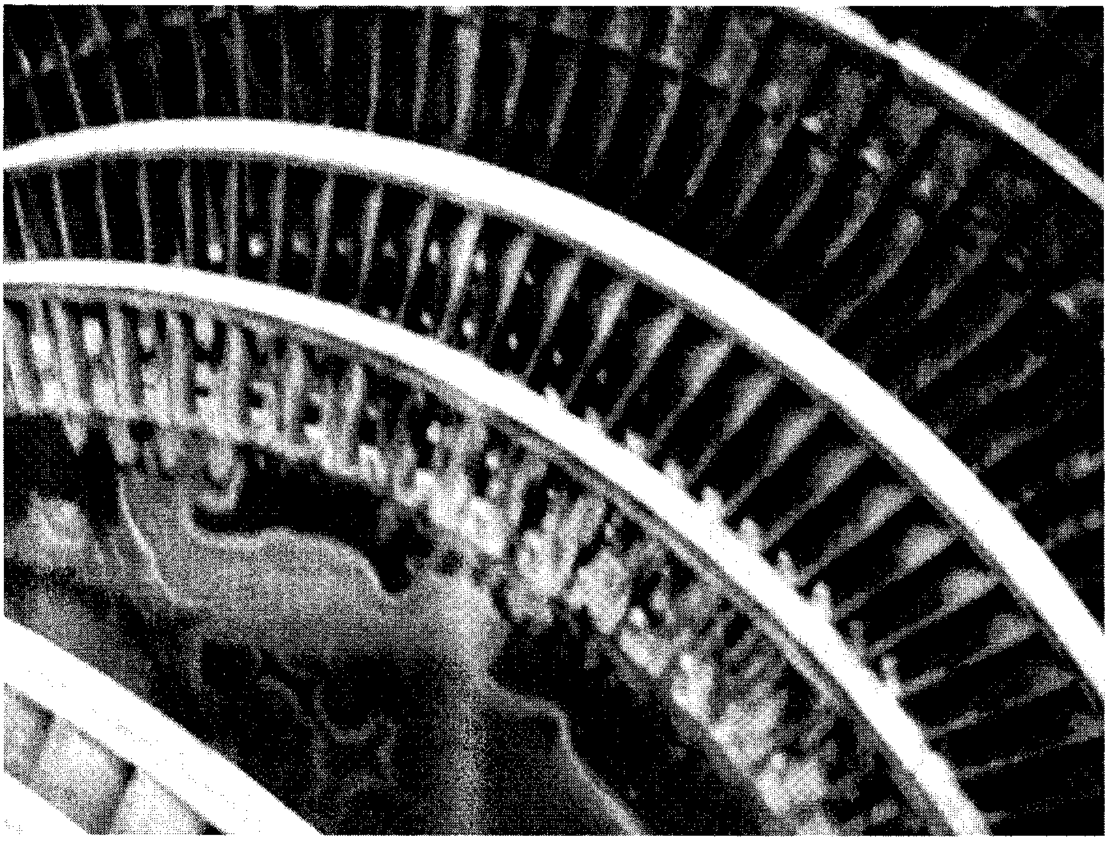
Four of the crossover bolt holes on the 2nd reheat shell were stripped out. These holes had helicoils installed in them. All of the vertical joint bolting for the crossovers had to be replaced.

The TE left side flange for the crossover pipe that bolts on to the 2nd reheat shell had previously been drilled and fittings installed to Furmanite the flange. These fitting were checked for integrity. The access cover on the same crossover pipe was removed to change the gasket which had been leaking.

All components were reassembled and all bolting was torqued to Westinghouse specifications.

Mitchell Unit 1 – LP "A" Rotor

Fall 2001 Outage

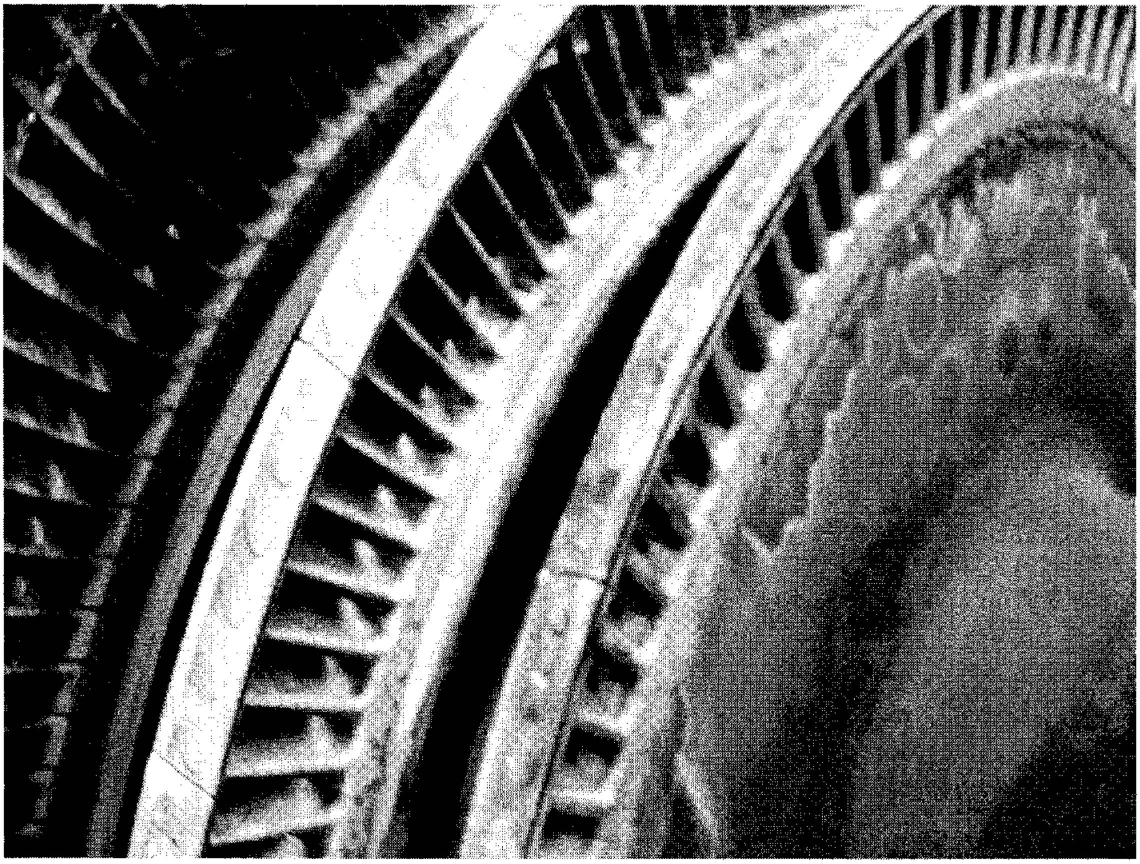


Comments:

This photo shows the blading for the LP "A" rotor. Note the white deposits on the blading. The rotor was replaced with a spare rotor.

Mitchell Unit 1 – LP "A" Turbine

Fall 2001 Outage



Comments:

Another photo of the deposits on the blading of the LP "A" rotor. The rotor was replaced with a spare rotor.

SIEMENS
Westinghouse

CUSTOMER: AEP
LOCATION/UNIT #: MITCHELL #1

LP 1 REACTION BLADING CLEARANCES

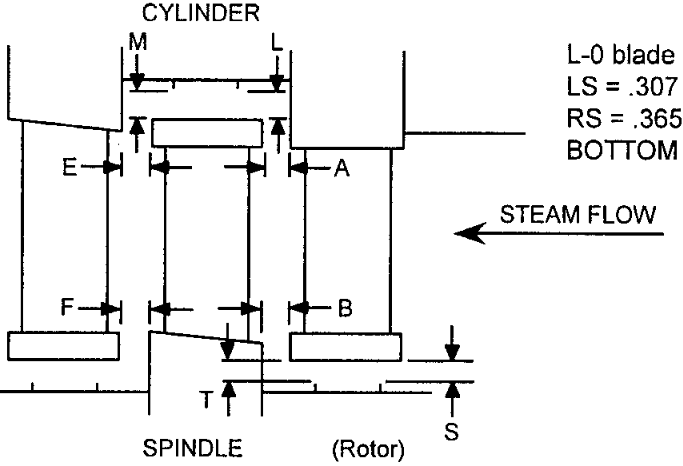
BB/FRAME: JOB NO.:
COMPONENT/S.O.: DWG.: 749J596

The rotor was set on "K" = .755 RS Gov.
L Gov = 18.386 LS

L Gen = 4.649

#5 oil bore : LS 8.772 Bot 8.753 RS 8.758
#6 oil bore : LS 7.782 Bot 7.769 RS 7.776

Spare rotor # TD39437



L-0 blade tip clearance
LS = .307
RS = .365
BOTTOM = .450

Gov end

	LEFT SIDE								RIGHT SIDE							
ROW	A	B	L	M	S	T			A	B	L	M	S	T		
1	0.774	0.765	0.060	0.057	__	__			0.757	0.738	0.068	0.080	__	__		
2	1.109	0.786	0.070	0.070	__	0.062			1.094	0.776	0.058	0.058	__			
3	1.300	0.895	__	0.140	__	0.080			1.213	0.845	__	0.102	__	0.065		
4	__	0.802	__	__	__	0.095			__	0.795	__	__	__	0.105		

Tool # Used ____________________ Cal. Due Date __________

As Found __________ Reading Taken By: _Brothers_______ Date: _10/1/01___

As Assembled ___X_____ Reviewed By (W) Eng.: ________________ Date: ______

SIEMENS

Westinghouse

CUSTOMER: AEP
LOCATION/UNIT #: MITCHELL #1

LP 1 REACTION BLADING CLEARANCES

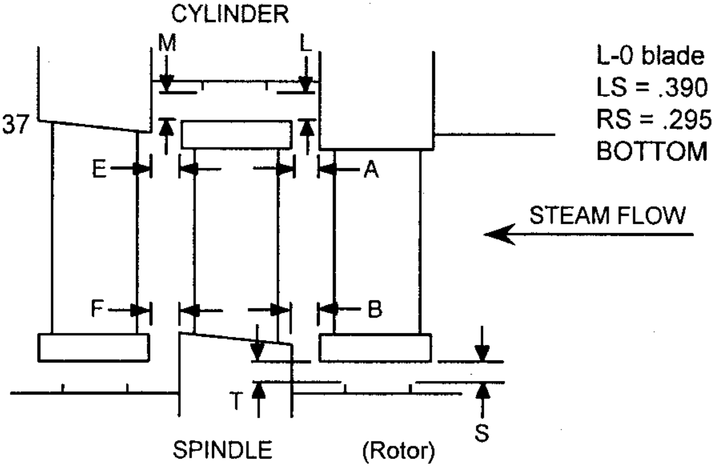
BB/FRAME: JOB NO.:
COMPONENT/S.O.: DWG.: 749J596

The rotor was set on "K" = .755 RS Gov.
L Gov = 18.386 LS

L Gen = 4.649

#5 oil bore : LS 8.772 Bot 8.753 RS 8.758
#6 oil bore : LS 7.782 Bot 7.769 RS 7.776

Spare rotor # TD39437



L-0 blade tip clearance
LS = .390
RS = .295
BOTTOM = .332

Gen end

	LEFT SIDE								RIGHT SIDE							
ROW	A	B	L	M	S	T			A	B	L	M	S	T		
1	0.478	0.452	0.067	0.077	__	__			0.471	0.440	0.056	0.056	__	__		
2	0.688	0.470	0.067	0.078	__	0.076			0.685	0.480	0.056	0.052	__	0.033		
3	0.998	0.592	__	0.112	__	0.080			0.965	0.565	__	0.082	__	0.060		
4	__	0.545	__	__	__	0.120			__	0.566	__	__	__	0.085		

Tool # Used ______________________________ Cal. Due Date __________

As Found __________ Reading Taken By: _Brothers_______ Date: _10/1/01___

As Assembled ___X_____ Reviewed By (W) Eng.: ________________ Date: ______

FILE: F46586.PPT Rev. 00

SIEMENS

Westinghouse

CUSTOMER: AEP	
LOCATION/UNIT #: MITCHELL #1	
LP 1 ROTOR FLOAT	
BB/FRAME:	JOB NO.:
COMPONENT/S.O.:	DWG.:

Spare Rotor # TD39437

"L" GOV =	18.384
"L" GEN =	4.634
RS GOV END "K" =	0.755

ASSEMBLY RECORD

CONDITION	TO GOV.	TO GEN.	TRAVEL FWD	TRAVEL AFT	TOTAL TRAVEL
"L" GOV	18.631	17.916	0.248	0.467	0.715
"L" GEN	4.383	5.099	0.251	0.465	0.716
Contact Point	LS row 1 Gen "L" seal axial	LS row 1 Gov "L" seal axial			
Design contact point	2-D (Gen)	2-D (Gov)	Design =.310	Design =.670	Design =.980

Note: No top half components installed

FILE: LP045.PPT Rev. 00

Tool # Used ____________________ Cal. Due Date __________

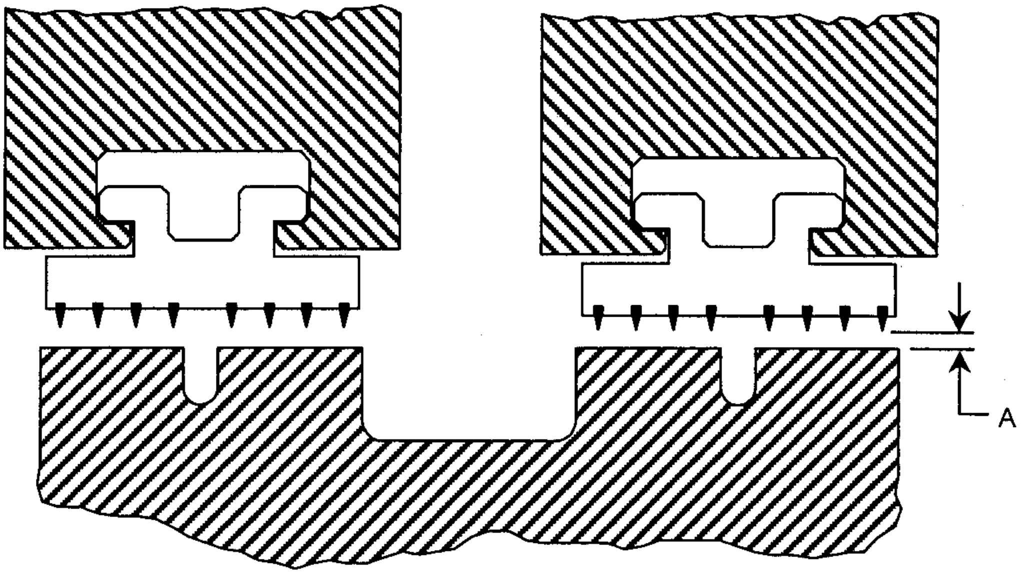
As Found __________ Reading Taken By: __J. Brother________ Date: _10/1/01____

As Assembled ____X_____ Reviewed By (W) Eng.: ______________ Date: _________

SIEMENS
WESTINGHOUSE

CUSTOMER: AEP	
LOCATION/UNIT #: MITCHELL #1	
LP 1 OUTER STEAM GLAND	
BB/FRAME:	JOB NO.:
COMPONENT/S.O.:	DWG.:

Spare Rotor # TD39437



Spring back seals were make by Starr. Readings were recorded by Starr.

	DIMENSION A			
	LEFT	RIGHT		
#5 OUTER GLAND ROW 1 AIR SIDE	0.04	0.04		
#5 OUTER GLAND ROW 2	0.028	0.022		
#5 OUTER GLAND ROW 3	0.028	0.023		
#5 OUTER GLAND ROW 4 STEAM SIDE	0.027	0.022		
#6 OUTER GLAND ROW 5 STEAM SIDE	0.023	0.017		
#6 OUTER GLAND ROW 6	0.022	0.016		
#6 OUTER GLAND ROW 7	0.018	0.022		
#6 OUTER GLAND ROW 8 AIR SIDE	0.032	0.033		

As Found ______ Reading Taken By: Starr Company Date: 10/4/01

As Assembled X Reviewed By (W) Eng.: ______ Date: ______

FILE: MS011.PPT Rev. 01

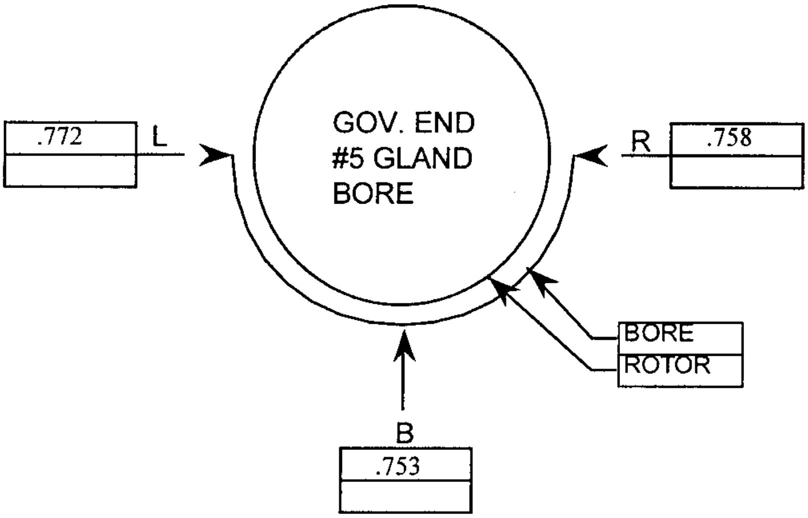
SIEMENS
WESTINGHOUSE

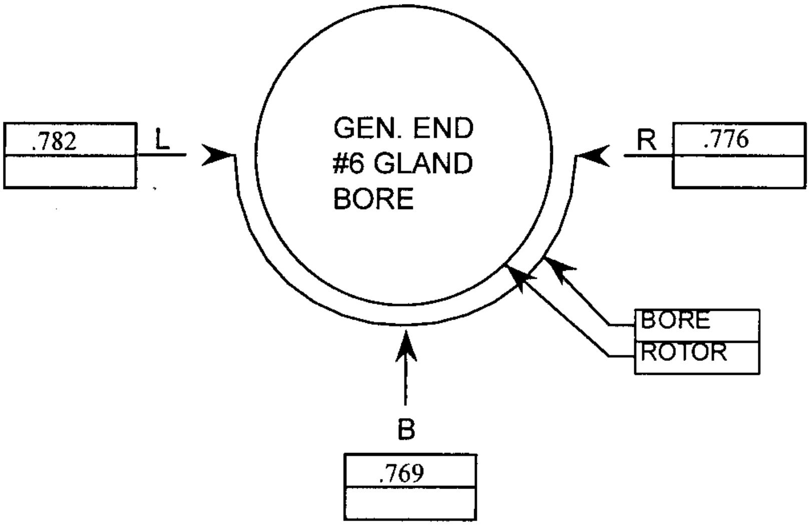
CUSTOMER:	AEP
LOCATION/UNIT #:	Mitchell #1

LP1 GLAND BORE

BB/FRAME:
JOB NO.:
COMPONENT/S.O.: LP1 ROTOR

Rotor # TD35045





Tool # Used ____________________

Cal. Due Date __________

As Found __________

Reading Taken By: __G.Rahn____________________

Date: __10/01/01________

As Assembled ____X______
(Prior to coupling alignment moves)

Reviewed By (W) Eng.: ____________________

Date: __________

FILE: HP023.PPT Rev. 01

SIEMENS

Westinghouse

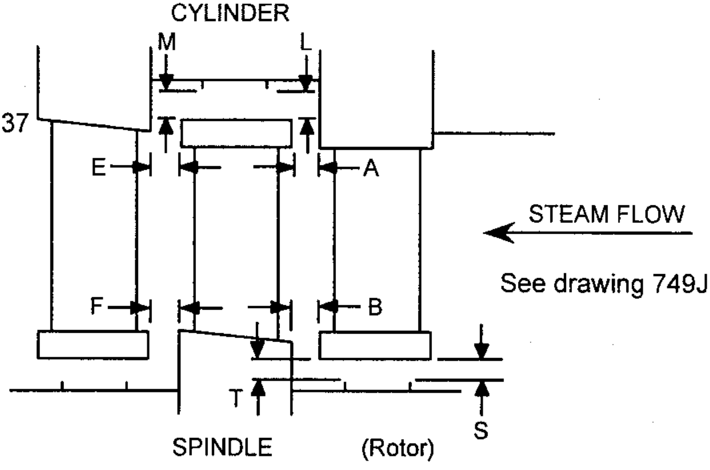
CUSTOMER: AEP	
LOCATION/UNIT #: MITCHELL #1	
LP 1 REACTION BLADING CLEARANCES	
BB/FRAME:	JOB NO.:
COMPONENT/S.O.:	DWG.: 749J596

The rotor was set on "K" = .755 RS Gov.
L Gov = 18.385 LS

#5 oil bore : LS 8.764 Bot 8.766 RS 8.748
#6 oil bore : LS 7.778 Bot 7.764 RS 7.780

Spare rotor # TD39437

Compatibility Data



See drawing 749J596 for sketch

Gov end

	LEFT SIDE								RIGHT SIDE							
ROW	A	B	L	M	S	T			A	B	L	M	S	T		
1	0.778	0.781	0.060	0.070	__	__			0.755	0.742	n/a	n/a	__	__		
2	1.022	0.792	n/a	0.080	__	n/a			1.092	0.775	n/a	n/a	__	n/a		
3	1.286	0.897	__	0.225	__	0.070			1.221	0.850	__	0.140	__	0.071		
4	__	0.792	__	__	__	n/a			__	0.780	__	__	__	n/a		

Seal with n/a - damaged

Tool # Used ____________________ Cal. Due Date __________

As Found __________ Reading Taken By: _Brothers, Night Shift_______ Date: _9/12/01___

As Charted ___X_____ Reviewed By (W) Eng.: ________________ Date: ______

SIEMENS
Westinghouse

CUSTOMER: AEP
LOCATION/UNIT #: MITCHELL #1

LP 1 REACTION BLADING CLEARANCES

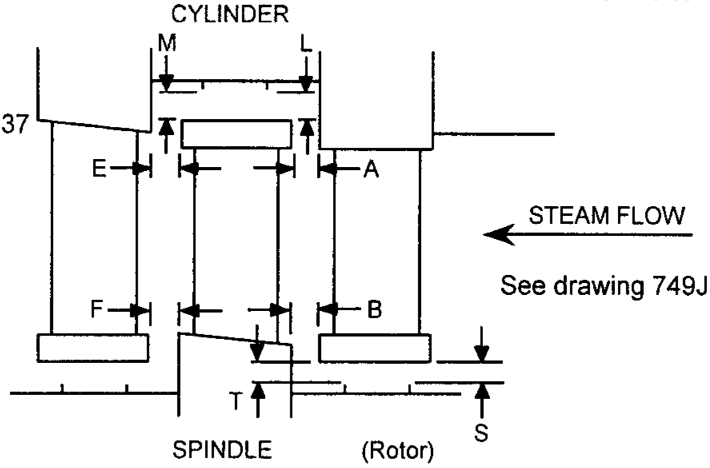
BB/FRAME: JOB NO.:
COMPONENT/S.O.: DWG.: 749J596

The rotor was set on "K" = .755 RS Gov.
L Gov = 18.385 LS

#5 oil bore : LS 8.764 Bot 8.766 RS 8.748
#6 oil bore : LS 7.778 Bot 7.764 RS 7.780

Spare rotor # TD39437

Compatibility Data



See drawing 749J596 for sketch

Gen end

	LEFT SIDE								RIGHT SIDE							
ROW	A	B	L	M	S	T			A	B	L	M	S	T		
1	0.472	0.455	0.090	n/a	—	—			0.450	0.430	0.115	n/a	—	—		
2	0.728	0.460	0.068	n/a	—	0.082			0.683	0.468	0.100	n/a	—	0.041		
3	1.015	0.577	—	n/a	—	0.095			0.951	0.555	—	n/a	—	0.065		
4	—	0.528	—	—	—	n/a			—	0.523	—	—	—	0.092		

Seal with n/a - damaged

FILE: F46586.PPT Rev. 00

Tool # Used ____________________ Cal. Due Date __________

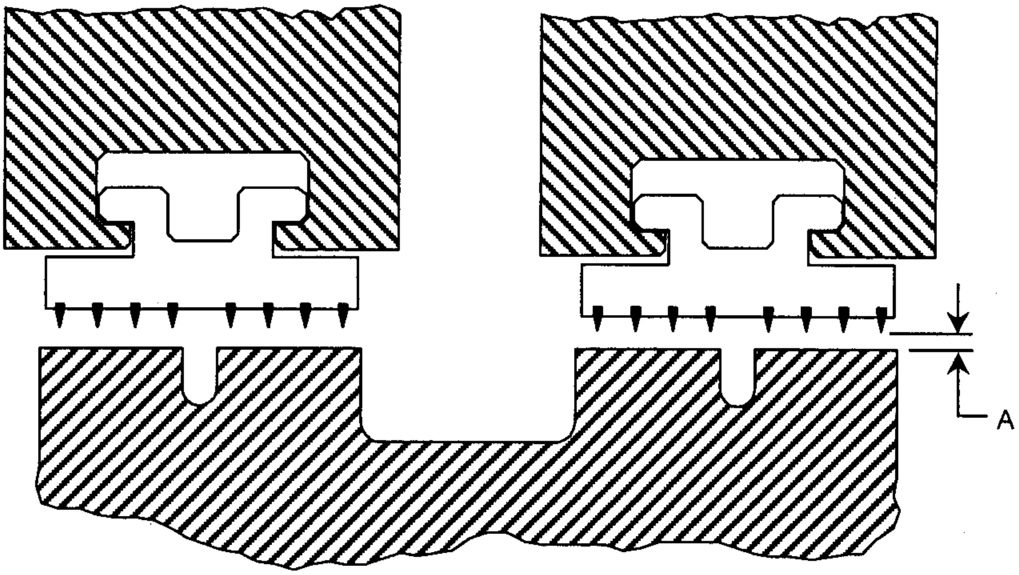
As Found __________ Reading Taken By: _Brothers, Night Shift______ Date: _9/12/01___

As Charted ___X_____ Reviewed By (W) Eng.: ______________ Date: ______

SIEMENS
WESTINGHOUSE

CUSTOMER: AEP	
LOCATION/UNIT #: MITCHELL #1	
LP 1 OUTER STEAM GLAND	
BB/FRAME:	JOB NO.:
COMPONENT/S.O.:	DWG.:

Spare Rotor # TD39437
Compatibility Data



	DIMENSION A			
	LEFT	RIGHT		
#5 OUTER GLAND ROW 1 AIR SIDE	0.05	0.051		
#5 OUTER GLAND ROW 2	0.017	0.034		
#5 OUTER GLAND ROW 3	0.023	0.028		
#5 OUTER GLAND ROW 4 STEAM SIDE	0.025	0.034		
#6 OUTER GLAND ROW 5 STEAM SIDE	0.025	0.032		
#6 OUTER GLAND ROW 6	0.022	0.032		
#6 OUTER GLAND ROW 7	0.020	0.028		
#6 OUTER GLAND ROW 8 AIR SIDE	0.034	0.031		

As Found ____________ Reading Taken By: ___Brothers, Night Shift____________ Date: _9/12/01_____

As Charted ____X______ Reviewed By (W) Eng.: ______________________________ Date: __________

FILE: MS011.PPT Rev. 01

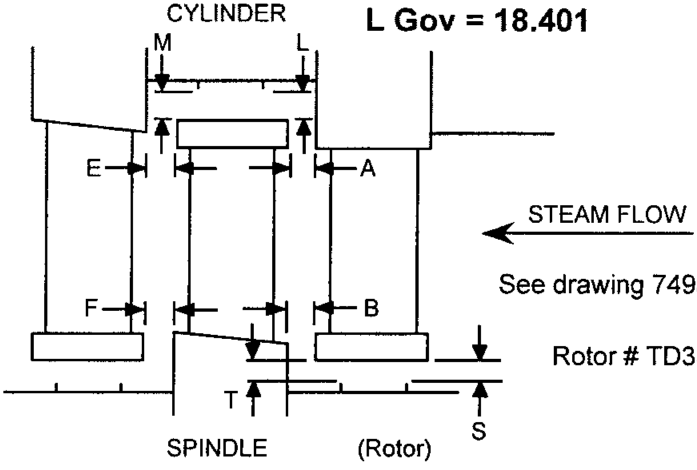
SIEMENS
Westinghouse

CUSTOMER: AEP
LOCATION/UNIT #: MITCHELL #1

LP 1 REACTION BLADING CLEARANCES

BB/FRAME: JOB NO.:
COMPONENT/S.O.: DWG.: 749J596

Calculated axial clearance from as found "K" = .682 to design "K" = .755
L Gov = 18.401



See drawing 749J596 for sketch

Rotor # TD35045

Gov end

	LEFT SIDE								RIGHT SIDE							
ROW	A	B	L	M	S	T			A	B	L	M	S	T		
1	0.778	0.798	0.047	0.045	—	—			0.755	0.908	0.061	0.072	—	—		
2	0.998	0.808	0.062	0.051	—	0.115			1.009	0.786	0.111	0.065	—	0.061		
3	1.351	0.423	—	0.160	—	0.087			1.266	0.893	—	0.085	—	0.072		
4	—	0.841	—	—	—	0.110			—	0.815	—	—	—	0.092		

Tool # Used ____________________ Cal. Due Date __________

As Found _____X_____ Reading Taken By: _G. Rahn_______ Date: _9/11/01___

As Assembled ________ Reviewed By (W) Eng.: ________________ Date: ______

SIEMENS
Westinghouse

CUSTOMER: AEP
LOCATION/UNIT #: MITCHELL #1

LP 1 REACTION BLADING CLEARANCES

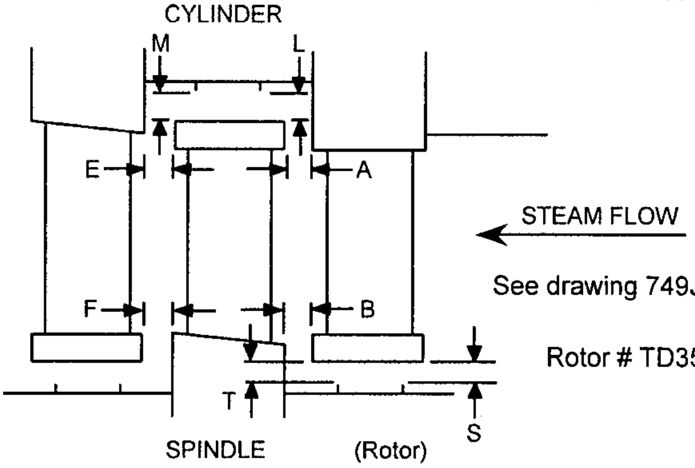
BB/FRAME: JOB NO.:
COMPONENT/S.O.: DWG.: 749J596

The rotor was set on "K" = .682 RS Gov.
Design "K" = .755 RS Gov

L Gov = 18.328 LS

#5 oil bore :	LS 8.769	Bot 8.750	RS 8.758
#6 oil bore :	LS 7.769	Bot 7.756	RS 7.771

Rotor was set to as found "L" dimension while charting



See drawing 749J596 for sketch

Rotor # TD35045

Gov end

	LEFT SIDE								RIGHT SIDE							
ROW	A	B	L	M	S	T			A	B	L	M	S	T		
1	0.705	0.725	0.047	0.045	__	__			0.682	0.835	0.061	0.072	__	__		
2	0.925	0.735	0.062	0.051	__	0.115			0.936	0.713	0.111	0.065	__	0.061		
3	1.278	0.350	__	0.160	__	0.087			1.193	0.820	__	0.085	__	0.072		
4	__	0.768	__	__	__	0.110			__	0.742	__	__	__	0.092		

Tool # Used ______________ Cal. Due Date ________

As Found _____X_____ Reading Taken By: _G. Rahn_______ Date: _9/11/01___

As Assembled ________ Reviewed By (W) Eng.: ______________ Date: ______

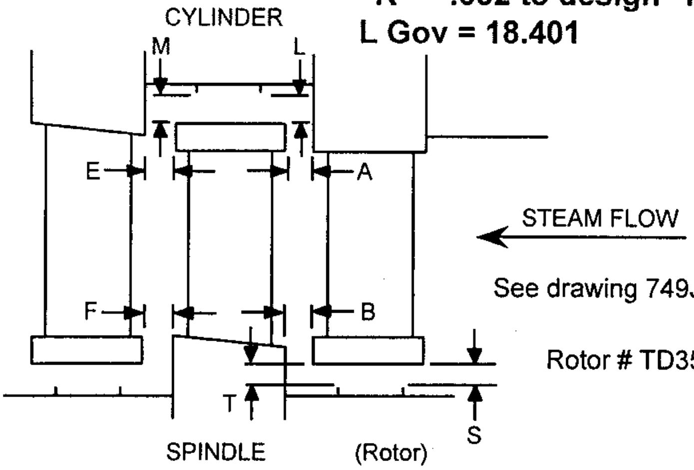
SIEMENS
Westinghouse

CUSTOMER: AEP
LOCATION/UNIT #: MITCHELL #1

LP 1 REACTION BLADING CLEARANCES

BB/FRAME: JOB NO.:
COMPONENT/S.O.: DWG.: 749J596

Calculated axial clearance from as found "K" = .682 to design "K" = .755
L Gov = 18.401



See drawing 749J596 for sketch

Rotor # TD35045

Gen end

	LEFT SIDE								RIGHT SIDE							
ROW	A	B	L	M	S	T			A	B	L	M	S	T		
1	0.442	0.426	0.068	0.123	—	—			0.415	0.408	0.070	0.080	—	—		
2	0.842	0.673	0.070	0.092	—	0.113			0.891	0.673	0.075	0.065	—	0.090		
3	0.950	0.571	—	0.295	—	0.083			0.928	0.541	—	0.120	—	0.077		
4	—	0.494	—	—	—	0.200			—	0.512	—	—	—	0.092		

FILE: F46586.PPT Rev. 00

Tool # Used ______________________________ Cal. Due Date __________

As Found _____X_____ Reading Taken By: _G. Rahn_______ Date: _9/11/01___

As Assembled ________ Reviewed By (W) Eng.: ________________ Date: ______

SIEMENS
Westinghouse

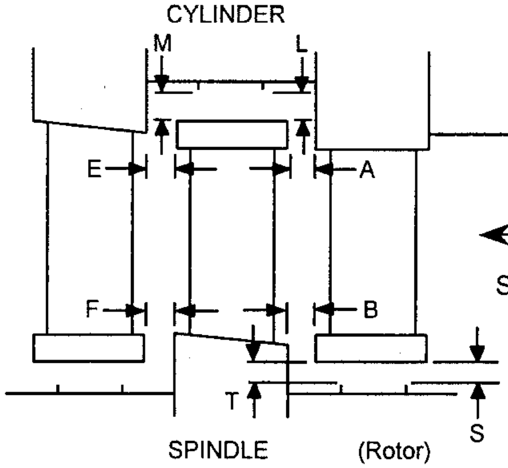
CUSTOMER: AEP	
LOCATION/UNIT #: MITCHELL #1	
LP 1 REACTION BLADING CLEARANCES	
BB/FRAME:	JOB NO.:
COMPONENT/S.O.:	DWG.: 749J596

The rotor was set on "K" = .682 RS Gov.
Design "K" = .755 RS Gov

L Gov = 18.328 LS

#5 oil bore : LS 8.769 Bot 8.750 RS 8.758
#6 oil bore : LS 7.769 Bot 7.756 RS 7.771

Rotor was set to as found "L" dimension while charting



STEAM FLOW

See drawing 749J596 for sketch

Rotor # TD35045

Gen end

	LEFT SIDE								RIGHT SIDE							
ROW	A	B	L	M	S	T			A	B	L	M	S	T		
1	0.515	0.499	0.068	0.123	—	—			0.488	0.481	0.070	0.080	—	—		
2	0.915	0.746	0.070	0.092	—	0.113			0.964	0.746	0.075	0.065	—	0.090		
3	1.023	0.644	—	0.295	—	0.083			1.001	0.614	—	0.120	—	0.077		
4	—	0.567	—	—	—	0.200			—	0.585	—	—	—	0.092		

Tool # Used ______________________________ Cal. Due Date __________

As Found _____X_____ Reading Taken By: _G. Rahn_______ Date: _9/11/01___

As Assembled ________ Reviewed By (W) Eng.: ________________ Date: ______

SIEMENS

Westinghouse

CUSTOMER: AEP	
LOCATION/UNIT #: MITCHELL #1	
LP 1 ROTOR FLOAT	
BB/FRAME:	JOB NO.:
COMPONENT/S.O.:	DWG.:

Rotor # TD35045

Calculated travel from as found "K" = .682 to design "K" = .755

"L" GOV=	18.401 (Calculated "L")
RS GOV END "K" =	0.755 (design)

ASSEMBLY RECORD					
CONDITION	TO GOV.	TO GEN.	TRAVEL FWD	TRAVEL AFT	TOTAL TRAVEL
"L" GOV	18.798	17.685	0.397	0.716	1.113
"L" GEN					
Contact Point	1-D seal (Gen)	1& 2 D seal (Gov)			
Design contact point	2-D (Gen)	2-D (Gov)	Design =.310	Design =.670	Design =.980

Tool # Used ____________ Cal. Due Date ________

As Found ____X______ Reading Taken By: __G. Rahn________ Date: _9/11/01____

As Assembled ________ Reviewed By (W) Eng.: ____________ Date: ________

SIEMENS
Westinghouse

CUSTOMER: AEP	
LOCATION/UNIT #: MITCHELL #1	
LP 1 ROTOR FLOAT	
BB/FRAME:	JOB NO.:
COMPONENT/S.O.:	DWG.:

Rotor # TD35045

"L" GOV =	18.328 (As found "L")
RS GOV END "K" =	0.682
RS GOV END "K" =	0.755 (design)

ASSEMBLY RECORD

CONDITION	TO GOV.	TO GEN.	TRAVEL FWD	TRAVEL AFT	TOTAL TRAVEL
"L" GOV	18.798	17.685	0.47	0.643	1.113
"L" GEN					
Contact Point	1-D seal (Gen)	1& 2 D seal (Gov)			
Design contact point	2-D (Gen)	2-D (Gov)	Design =.310	Design =.670	Design =.980

FILE: LP045.PPT Rev. 00

Tool # Used ____________ Cal. Due Date ________

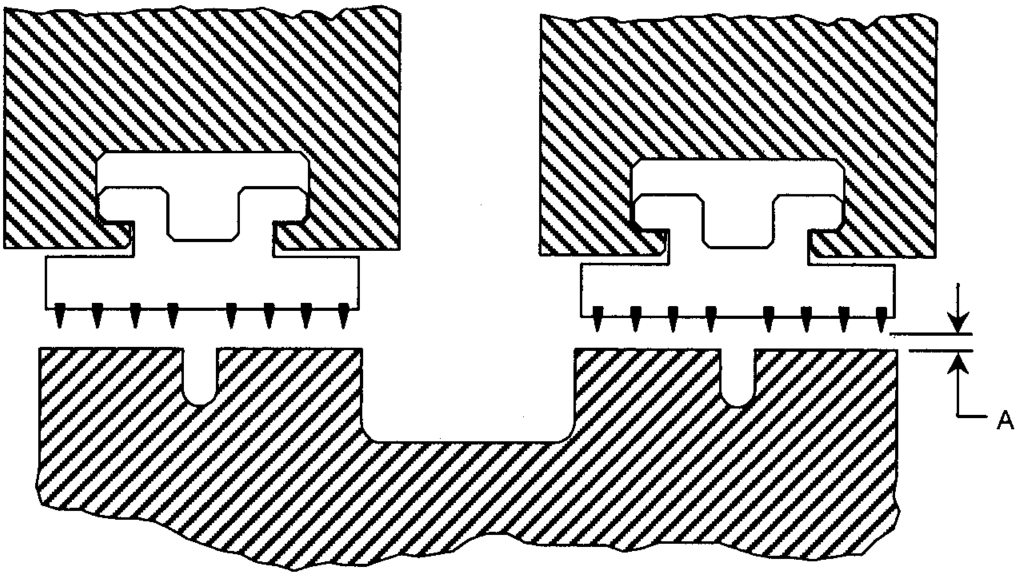
As Found ____X______ Reading Taken By: __G. Rahn________ Date: _9/11/01____

As Assembled ________ Reviewed By (W) Eng.: ____________ Date: ________

SIEMENS
WESTINGHOUSE

CUSTOMER: AEP	
LOCATION/UNIT #: MITCHELL #1	
LP 1 OUTER STEAM GLAND	
BB/FRAME:	JOB NO.:
COMPONENT/S.O.:	DWG.:

Rotor # TD35045



	DIMENSION A			
	LEFT	RIGHT		
#5 OUTER GLAND ROW 1 AIR SIDE	0.047	0.036		
#5 OUTER GLAND ROW 2	0.031	0.047		
#5 OUTER GLAND ROW 3	0.022	0.025		
#5 OUTER GLAND ROW 4 STEAM SIDE	0.025	0.023		
#6 OUTER GLAND ROW 5 STEAM SIDE	0.031	0.046		
#6 OUTER GLAND ROW 6	0.026	0.032		
#6 OUTER GLAND ROW 7	0.025	0.026		
#6 OUTER GLAND ROW 8 AIR SIDE	0.035	0.032		

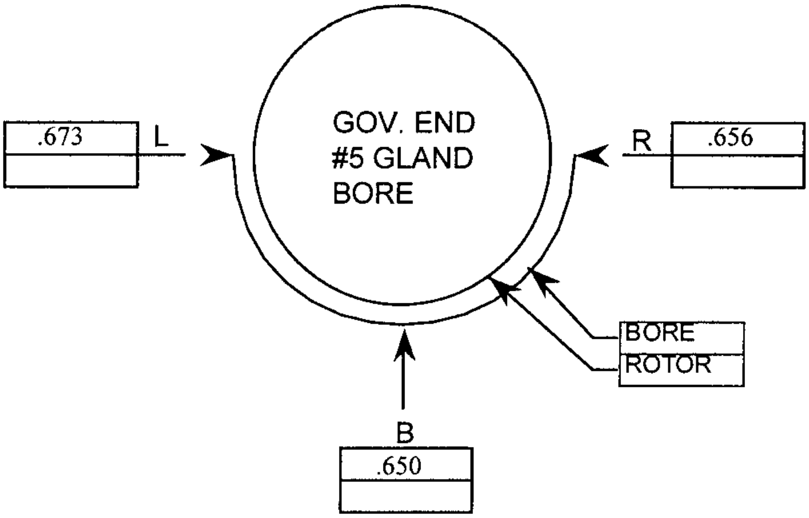
As Found ____X______ Reading Taken By: ____G. Rahn____________________ Date: 9/11/01______

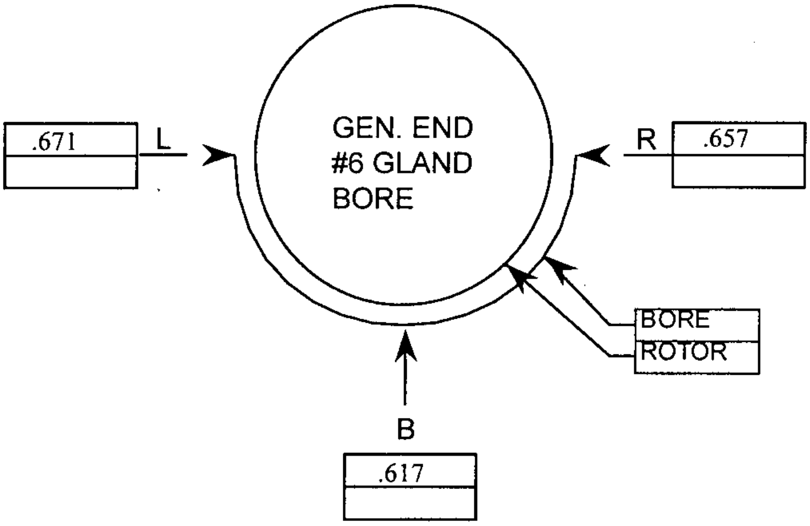
As Assembled __________ Reviewed By (W) Eng.: ____________________________ Date: __________

SIEMENS
WESTINGHOUSE

CUSTOMER: AEP	
LOCATION/UNIT #: Mitchell #1	
LP1 GLAND BORE	
BB/FRAME:	JOB NO.:
COMPONENT/S.O.: LP1 ROTOR	

Rotor # TD35045





Tool # Used ________________________ Cal. Due Date __________

As Found ____X______ Reading Taken By: __G.Rahn________________________ Date: __9/11/01________

As Assembled __________ Reviewed By (W) Eng.: ______________________________ Date: __________

Control System and Instrumentation

Turbine Controls

The controls system was upgraded under a project run by Jim Cable of AEP turbine engineering. The RSO was responsible for removal of the old controls equipment from the turbine and also for installing the new dump manifolds.

In the front standard of the turbine, all of the old controls components were removed. The vacuum trip was removed, the solenoid and control block were removed, the auto trip device was removed, the zero speed indicator was removed, the diaphragm valve was removed and all associated oil piping was removed. All components were discarded.

The trip finger and latch lever were removed. The over speed bolt was removed from the rotor and a plug was installed in the rotor.

In the mid standard, the thrust bearing wear detector was removed and discarded.

In the two standards, all oil piping penetrations from the standard were plugged. All control oil piping was plugged at any loose ends.

New EHC dump manifolds were installed in a cabinet near the front standard. New EHC piping was run to connect the manifold to the EHC supply, drain, trip header, and one for system pressure. All piping and tubing fittings were welded by RSO personnel. A new hand trip lever was installed and piped into the trip header system.

The over speed bolt, oil trip, and trip finger assembly were all removed from the BFP turbine front standard. The same style of dump manifold was installed for the BFP turbine. All piping and tubing fittings were welded by RSO personnel. A new hand trip lever was installed and piped into the BFP turbine trip header system.

The servo actuators for the throttle valves, governor valves, BFP turbine stop and control valves were all removed and sent out for inspection and repairs. The servos were all reinstalled during reassembly and the over travel for each servo was set at ½ inch.

All of the servo's were blanked or bypassed and a flush was done on the EHC operating fluid. Samples were taken and approved prior to finishing the flush. All blanks were removed.

All of the controls calibrations and valve stroking was done under the supervision of Jim Cable and Mitchell plant personnel. A copy of the prints used for the piping removal and installation are included with this report.

Instrumentation

The instrumentation for the turbine was upgraded during this outage. Bentley Nevada ran a "turn key" project for the upgrade.

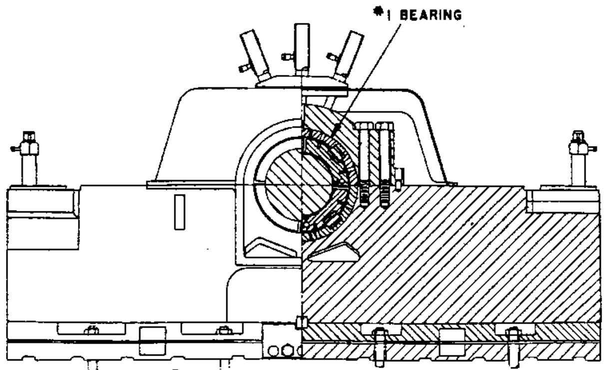
The existing shaft riding vibration probes for all ten bearings were removed and discarded. The differential expansion detector, shell expansion detector, eccentricity detector and rotor expansion detectors were all removed.

New Bentley Nevada non-contacting probes were installed to replace all of the vibration probes and detectors mentioned above. A new key phasor was added in the mid standard, and new rotor position probes were installed in the mid standard to replace the thrust wear detector. The turbine speed pickups were also replaced with new pickups.

Bentley Nevada personnel engineered and manufactured the mounting brackets for all of the vibration probes and pickups. Jim Cable of AEP turbine engineering approved all of the mounting brackets prior to their being manufactured. It should be noted that the probes were all mounted to read the bottom of the shaft rather than the top.

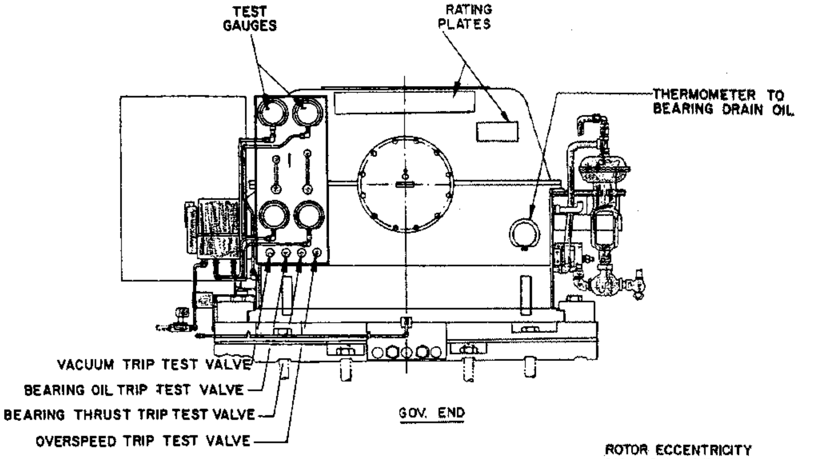
All areas where probes were installed had redundant probes installed. Bentley Nevada personnel performed the calibration and installation of the probes. Voltage gaps were also set by Bentley Nevada personnel.

On the BFP turbine, a key phasor was added to the rotor, and the speed and position probes were upgraded to Bentley Nevada equipment. The vibration probes had been upgraded previously, but were recalibrated by the Bentley Nevada personnel.

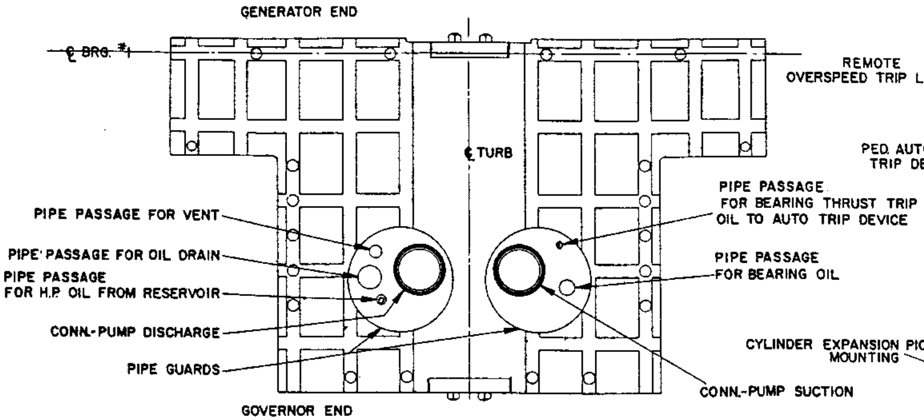


PARTIAL VIEW GENERATOR END

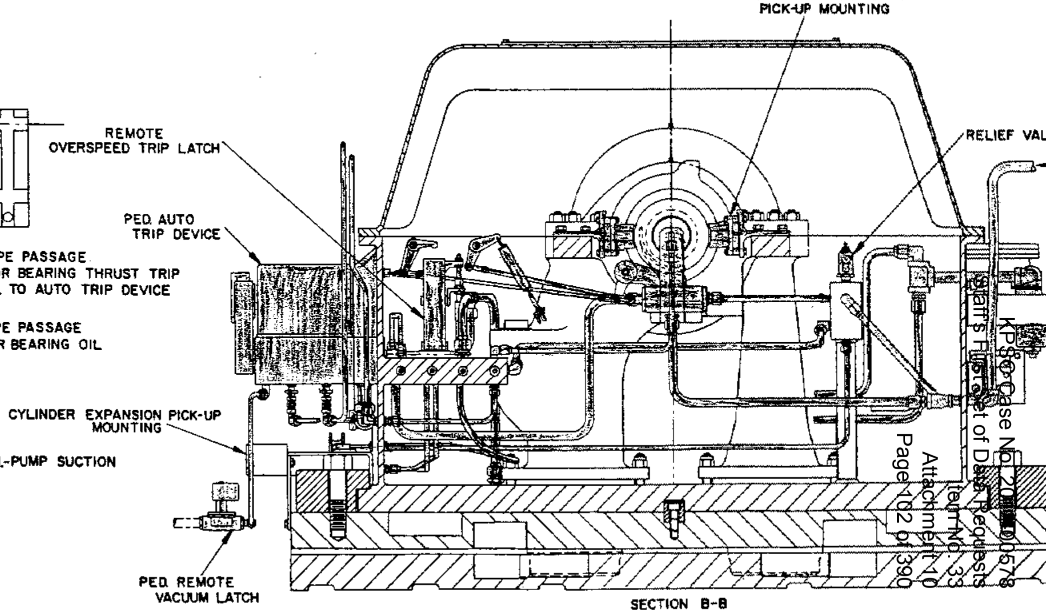
SECTION C-C



GOV. END



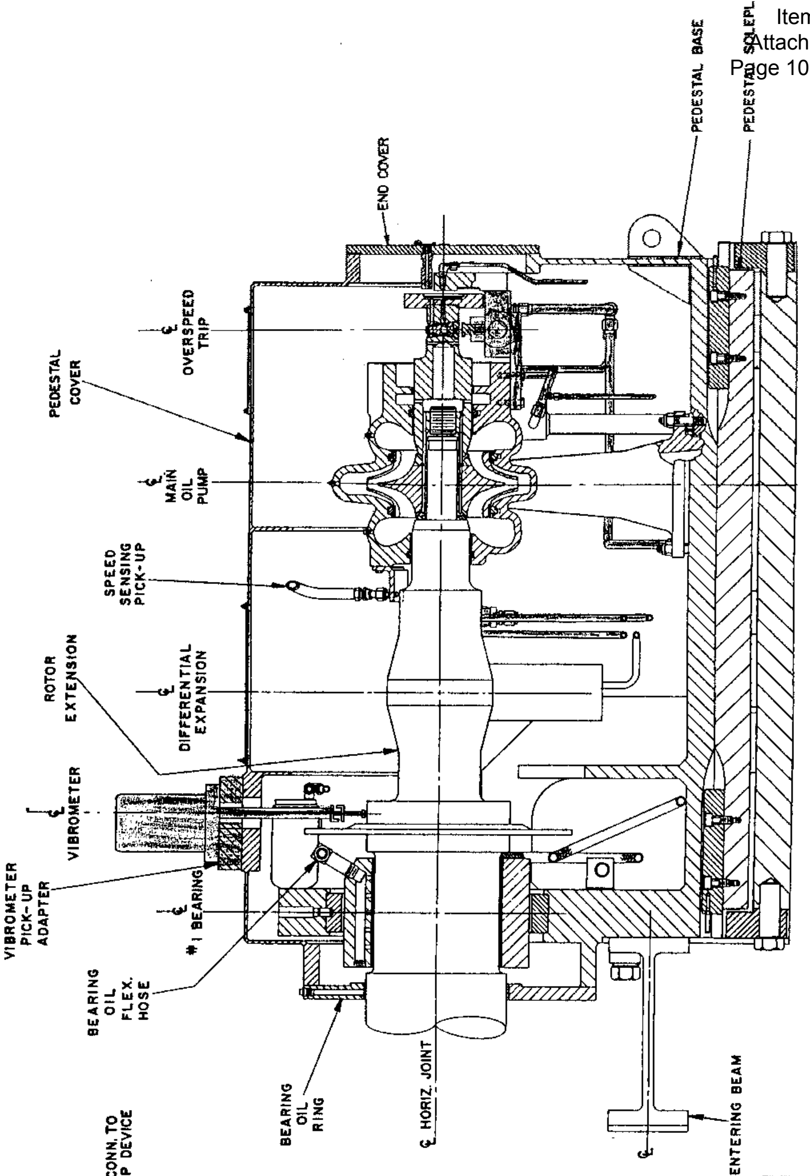
INVERTED PLAN VIEW



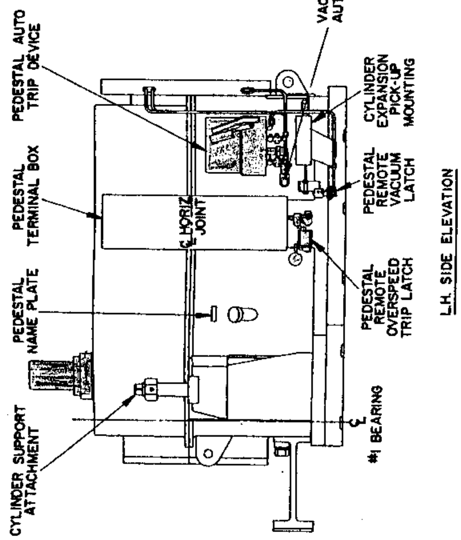
SECTION B-B

Governor End Pedestal (V.H.P.-H.P. Turbine)

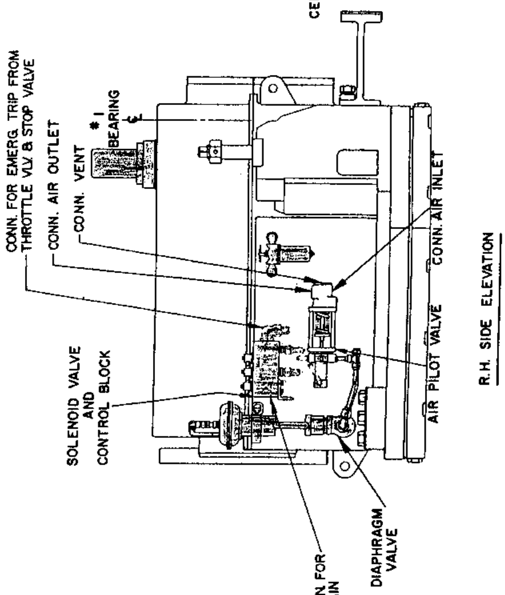
721-J-548-1



SECTION A-A



L.H. SIDE ELEVATION

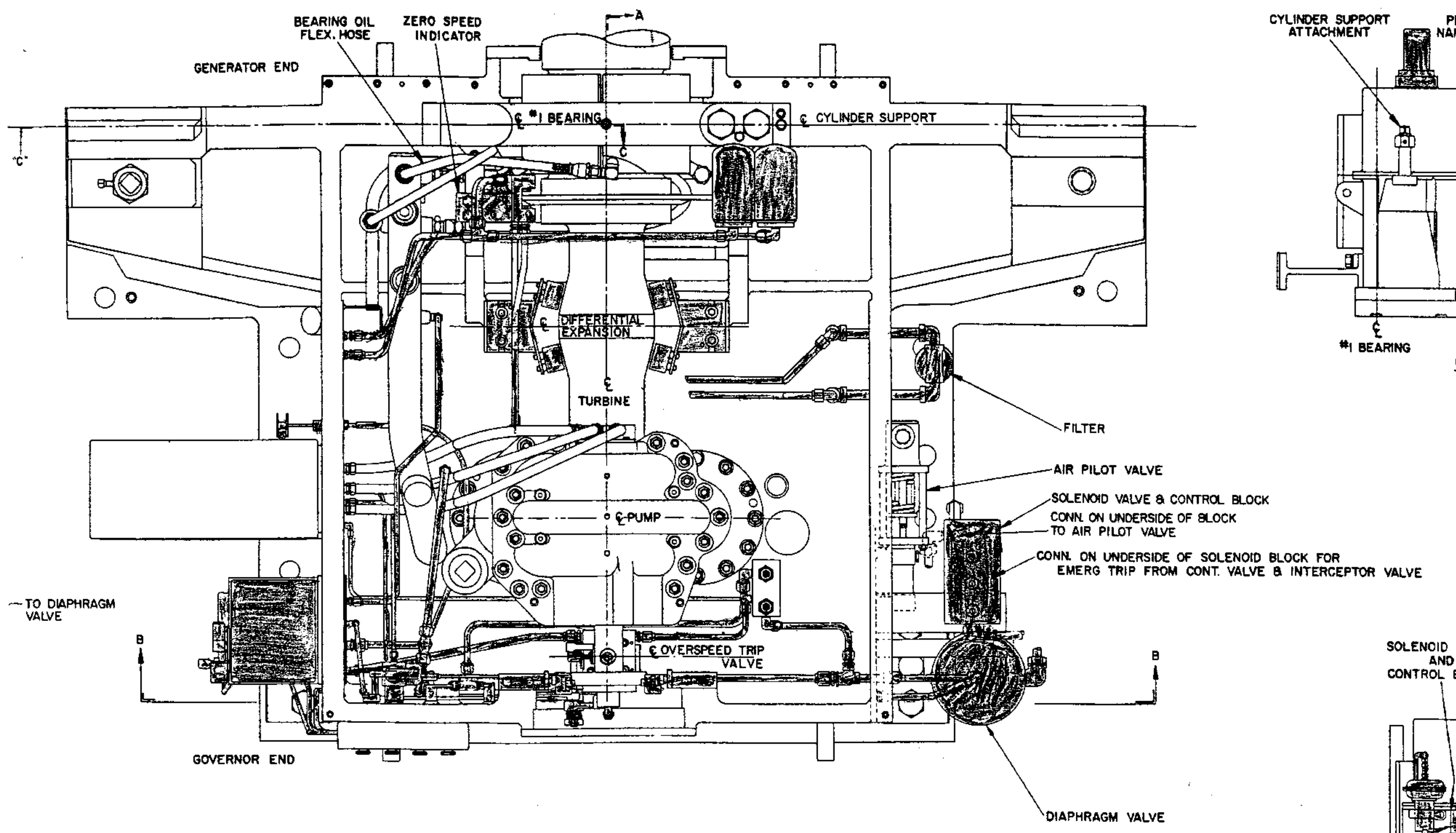


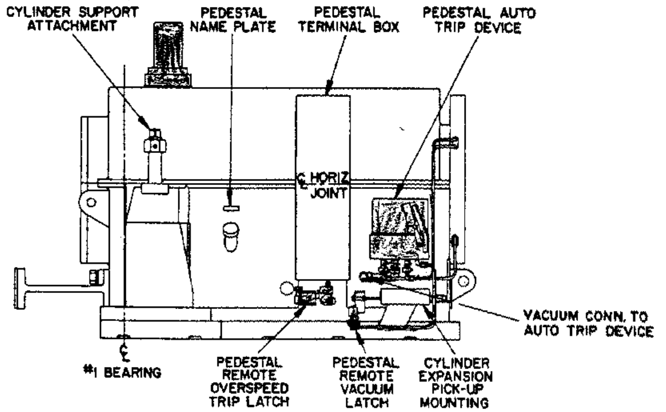
R.H. SIDE ELEVATION

CK

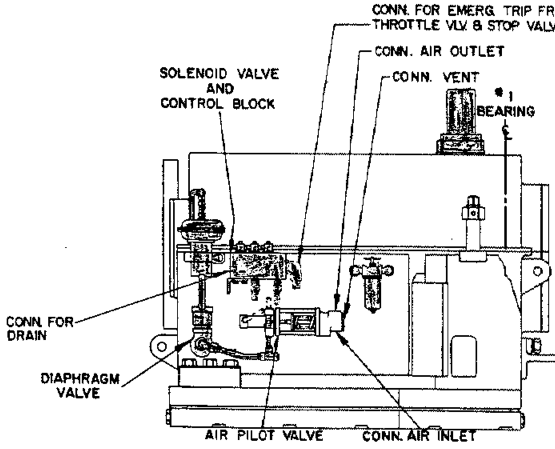
BLOCK FOR
E & INTERCEPTOR VALVE

NN. FOR
AIN

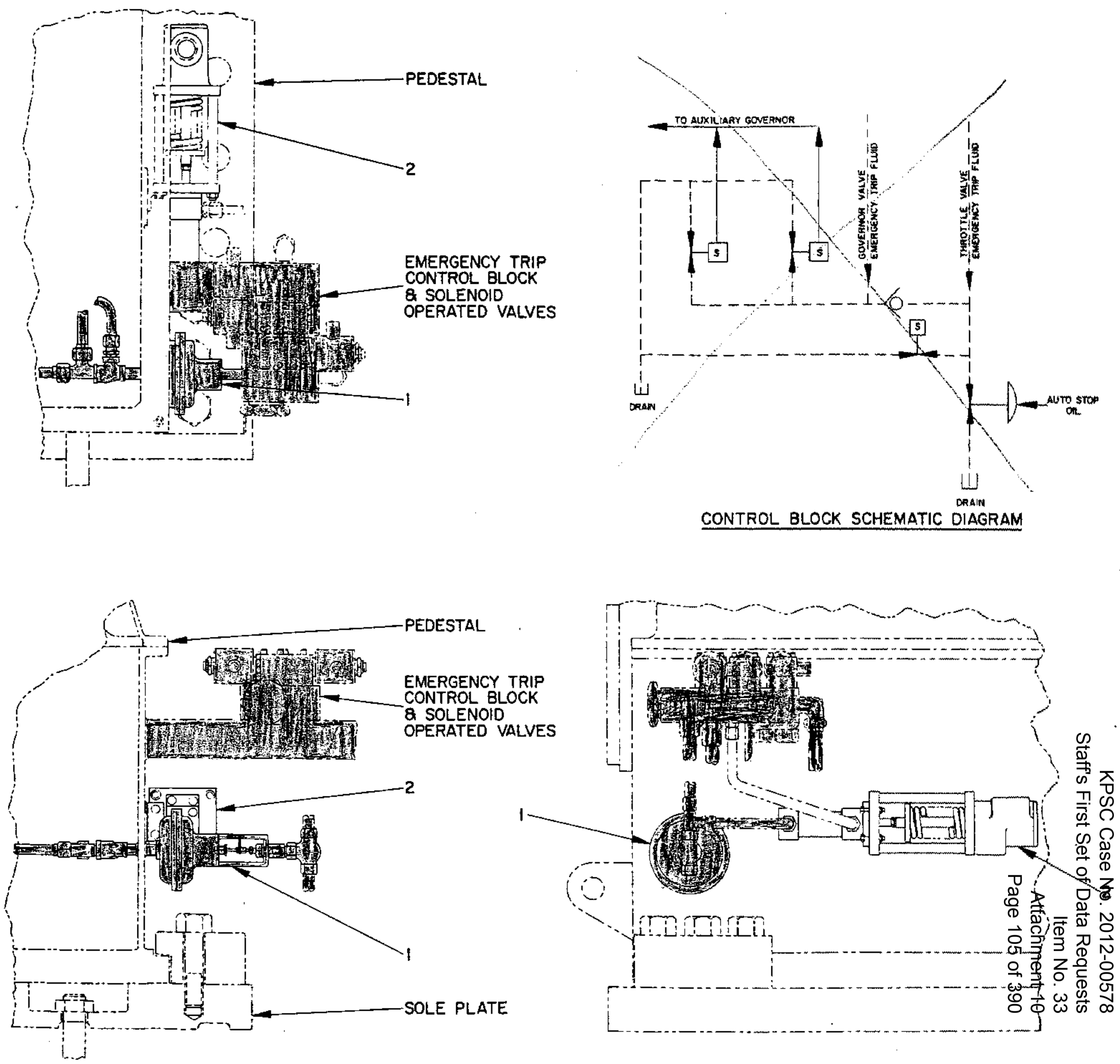




L.H. SIDE ELEVATION

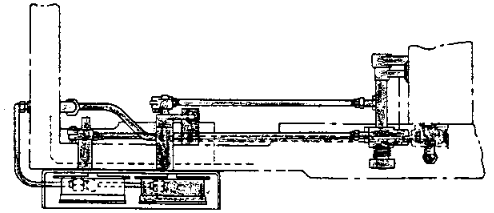


R.H. SIDE ELEVATION

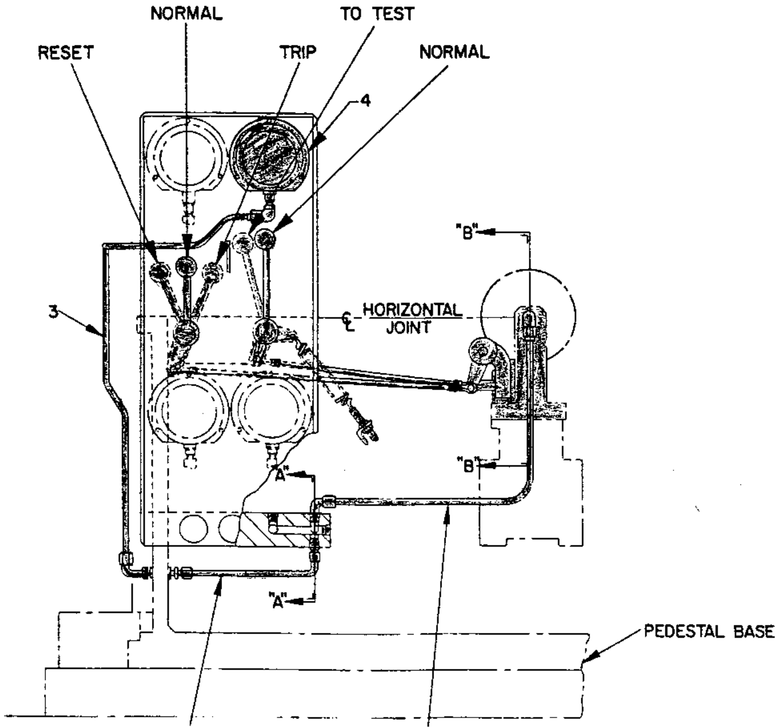


CONTROL BLOCK SCHEMATIC DIAGRAM

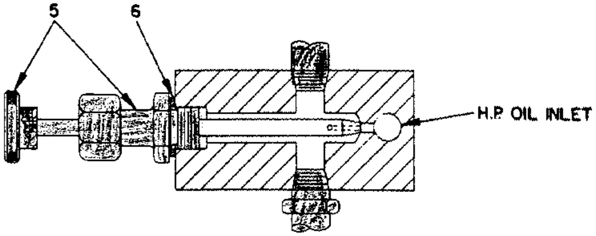
Figure 1



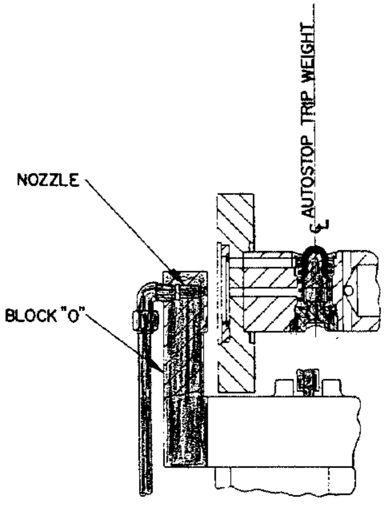
PLAN VIEW
WITH COVER REMOVED



END VIEW



SECTION "A-A"
ENLARGED



SECTION "B-B"
ENLARGED

Figure 1
I.L. 1250-3535

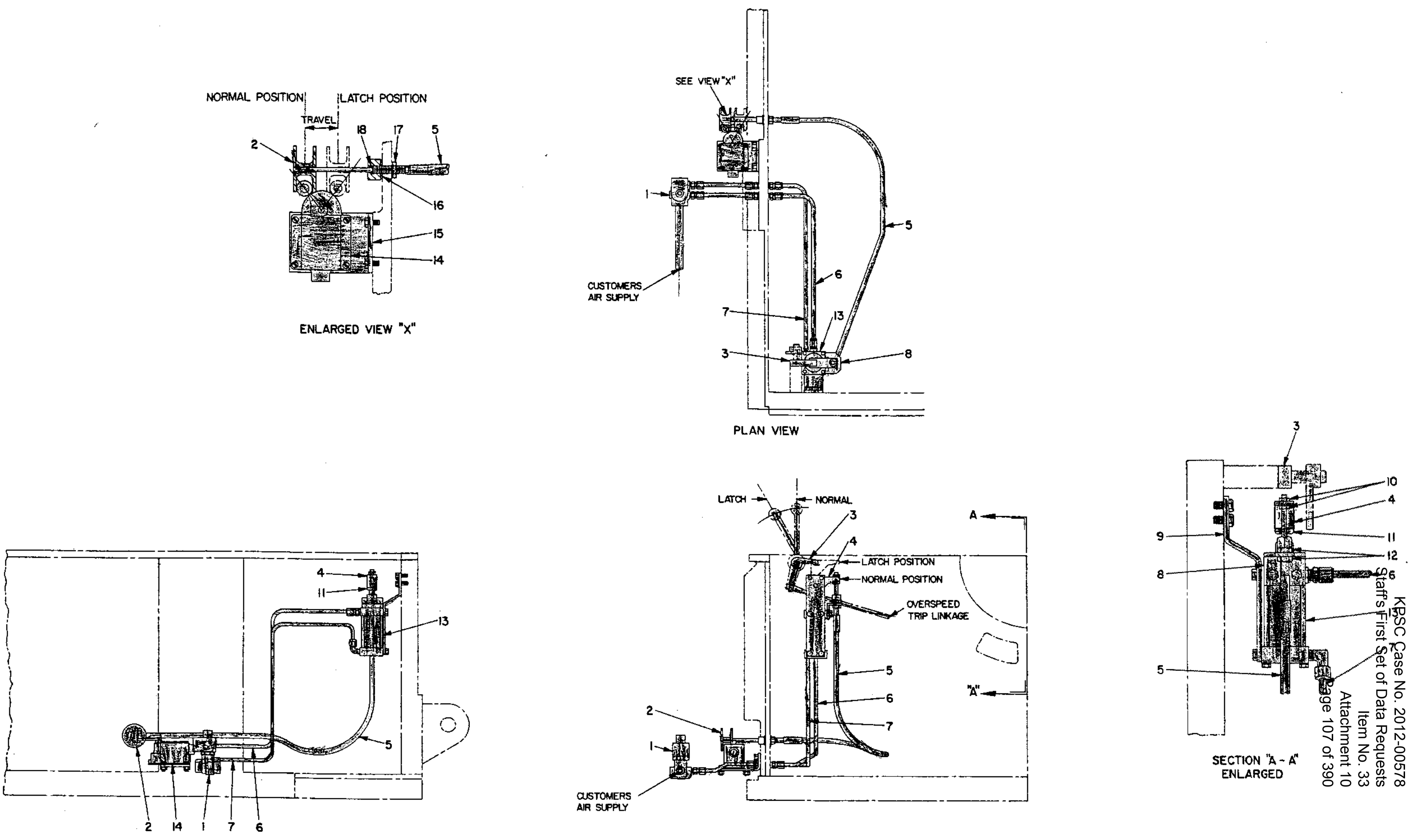


Figure 1
I.L. 1250-3455

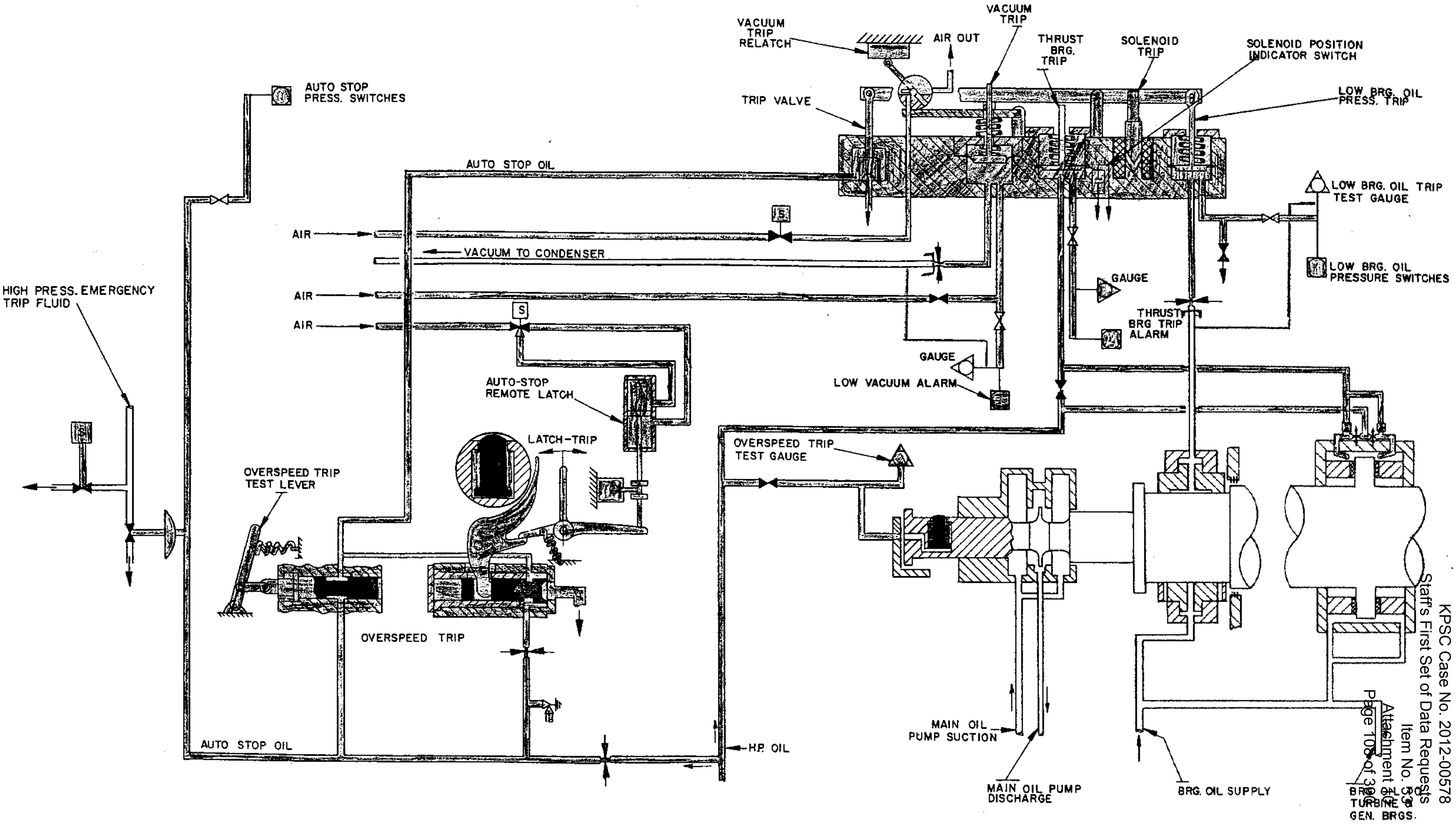


Figure 2

I.L. 1250-3559

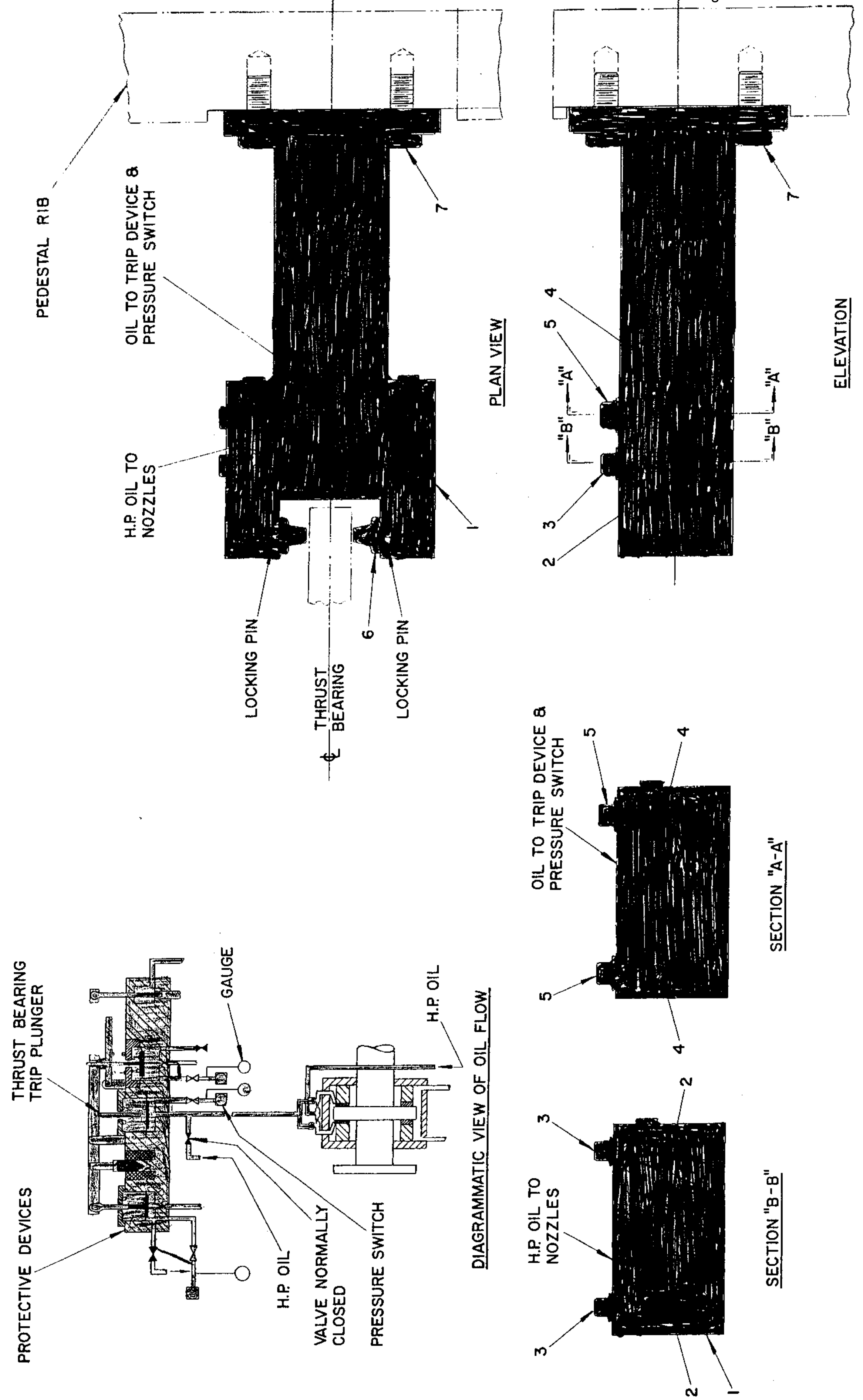
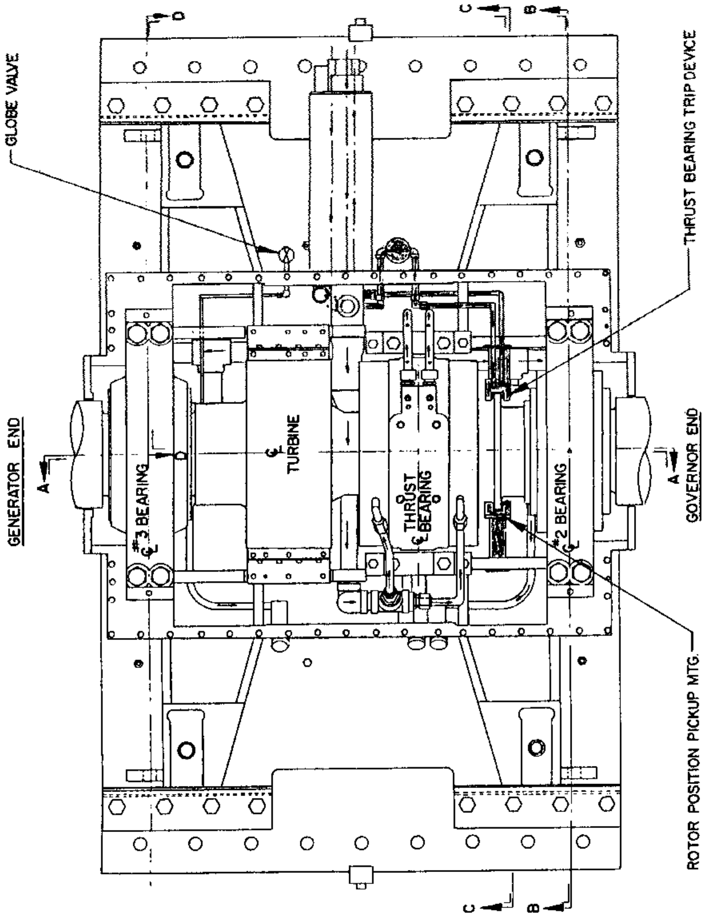
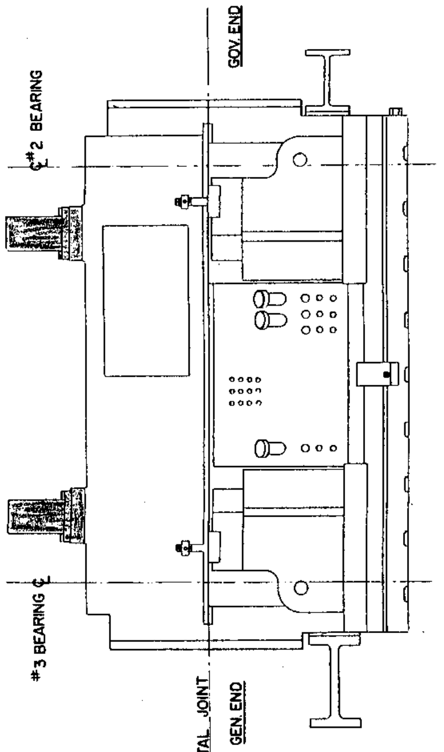


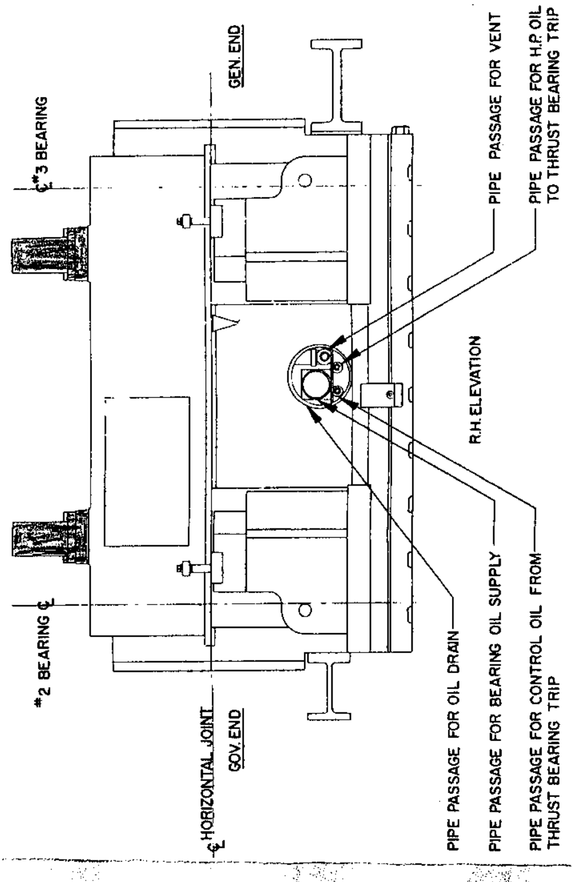
Figure 1
I.L. 1250-2806



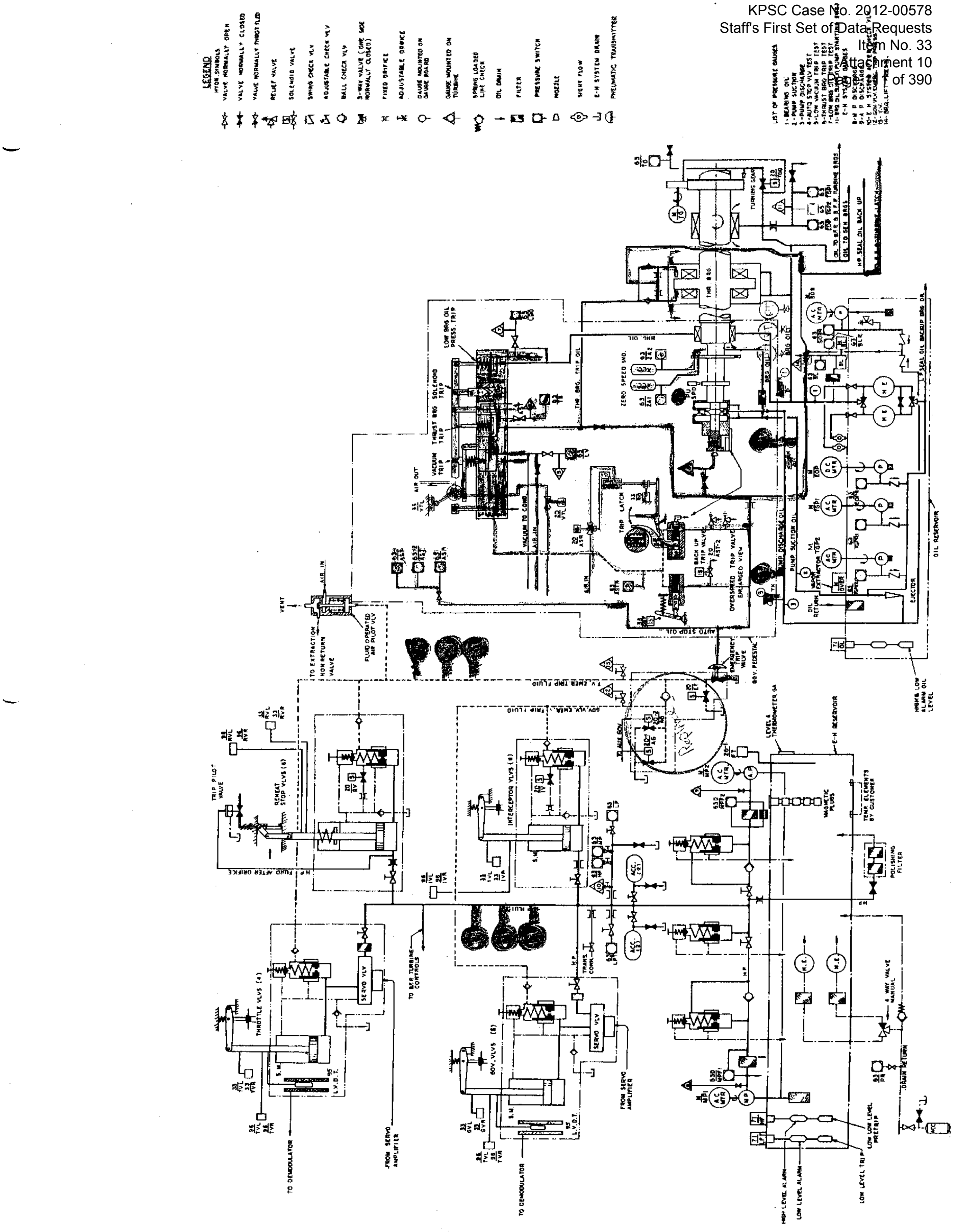
PLAN VIEW



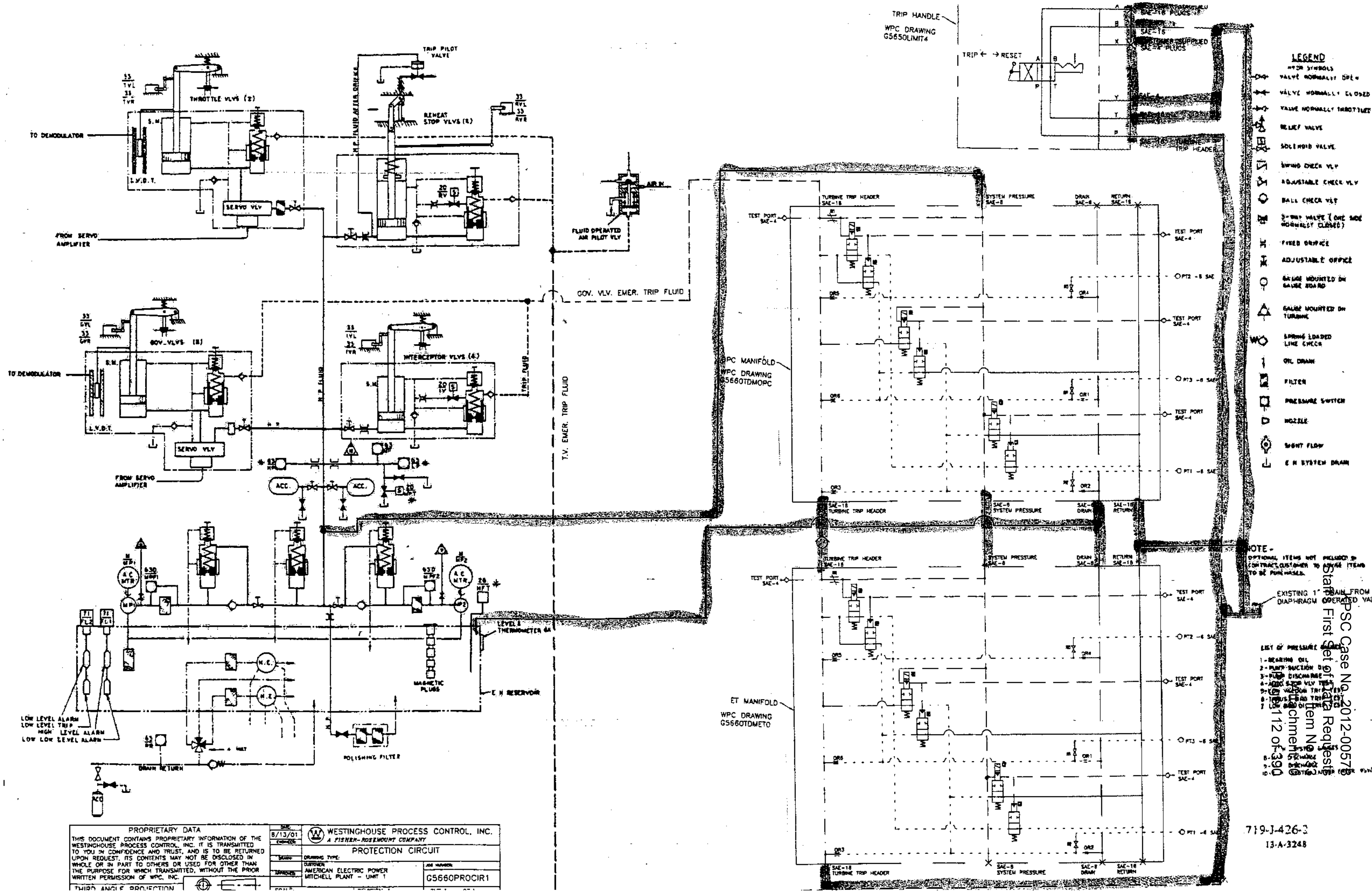
L.H. ELEVATION



R.H. ELEVATION



E-H Control and Oil System Diagram
(13-A-3160)
681-J-406-5



PROPRIETARY DATA

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THIRD ANGLE PROJECTION

DATE: 8/13/01

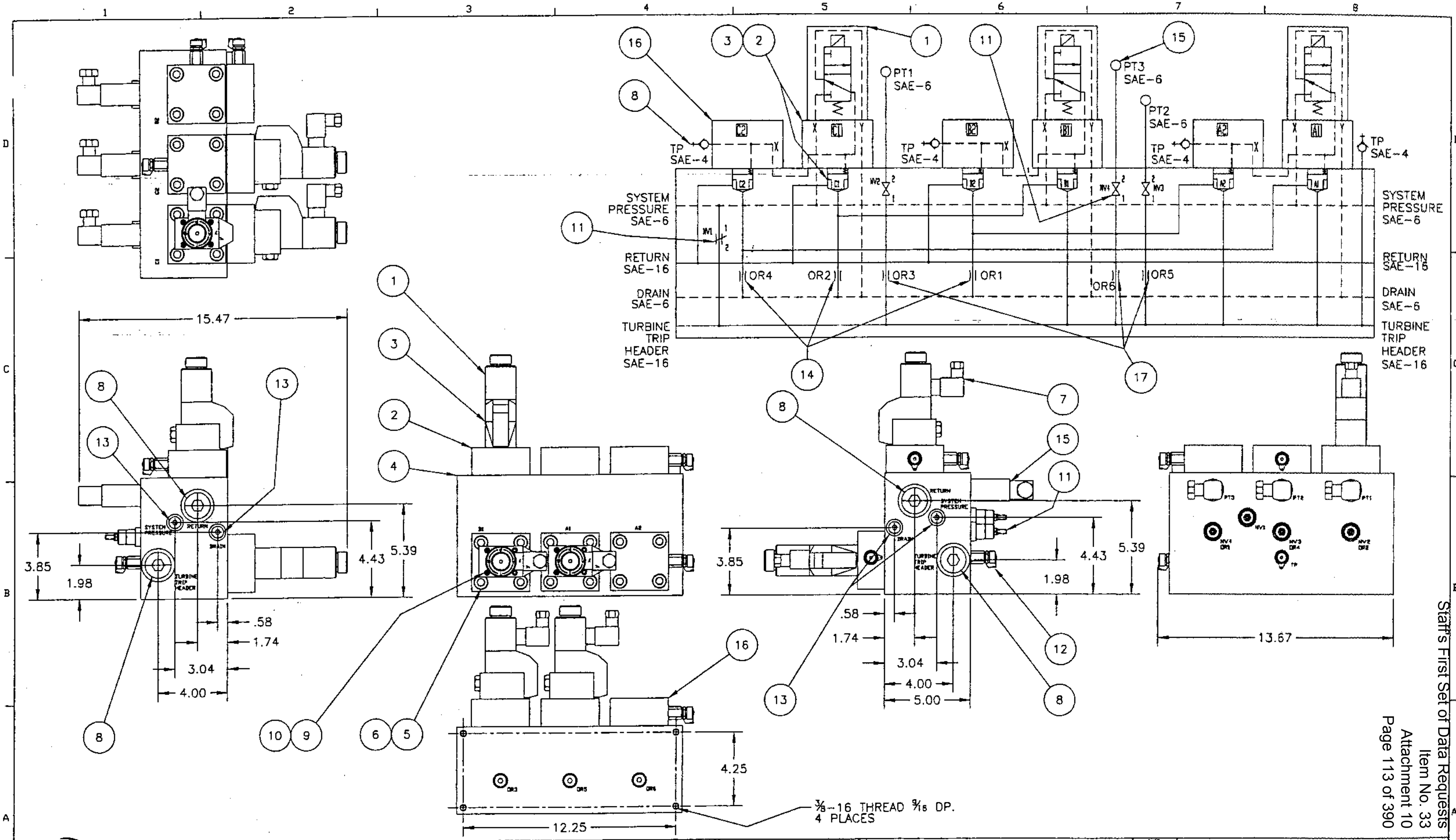
WESTINGHOUSE PROCESS CONTROL, INC.
A FISHER-ROSEMOUNT COMPANY

PROTECTION CIRCUIT

DRAWING TYPE:

CUSTOMER: AMERICAN ELECTRIC POWER
MITCHELL PLANT – UNIT 1

JOB NUMBER: G5660PROCIR1



B	AS BUILT CHANGES MEW 8/01
REVISION	

TOLERANCES
DECIMAL .XX +/- .015
.XXX +/- .005
FRACTION +/- 1/32
ANGLE +/- 1/2 DEG
FABRICATION
UP TO 24 IN. +/- 1/8
OVER 24 IN. +/- 1/4

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THIRD ANGLE PROJECTION

DATE: 1/22/01
ENGINEER: MEW
DRAWN:
APPROVED: TS
SCALE:

WESTINGHOUSE PROCESS CONTROL, INC.
A FISHER-ROSEMOUNT COMPANY

ET TESTABLE DUMP MANIFOLD
DRAWING TYPE: ASSEMBLY AND BILL OF MATERIAL
CUSTOMER: AMERICAN ELECTRIC POWER MITCHELL PLANT - UNIT 1
JOB NUMBER: WJ857A
G5660TDMETO
REVISION B
SHT 1 OF 2

BILL OF MATERIAL					
	ITEM	QTY	PART NUMBER	VENDOR	DESCRIPTION
*	1	3	M-3SEW6C3X/420MG24N9K4/V	REXROTH	SOLENOID VALVE, 24 VDC, DE-ENERGIZE TO TRIP
*	2	3	LFA25WEMB-7X/V/12	REXROTH	CONTROL COVER FOR MOUNTING DIRECTIONAL POPPET VALVE
*	3	6	LC25A05E7X/V	REXROTH	DIRECTIONAL POPPET TYPE VALVE
	4	1	14222	ALMO	CUSTOM CARTRIDGE MANIFOLD, 2-3 DESIGN, TESTABLE DUMP MANIFOLD
	5	12	1/2-13 UNC X 2	COMMERCIAL	HEXAGON SOCKET HEAD CAP SCREW
	6	12	1/2	COMMERCIAL	HIGH COLLAR LOCK WASHER
*	7	6	931-966-100	HIRSCHMANN	CABLE SOCKET, SELF ASSEMBLY FOR 24 VDC
	8	4	7238X16 VITON	WORLDWIDE	HOLLOW HEX PLUG, STRAIGHT THREAD O-RING
	9	24	#10-24 X 1 3/4	COMMERCIAL	HEXAGON SOCKET HEAD CAP SCREW
	10	24	#10	COMMERCIAL	HIGH COLLAR LOCKWASHER
*	11	4	NFCC-LCV	SUN HYDRAULICS	ADJUSTABLE NEEDLE VALVE
*	12	4	06007029/VITON	HYCON	PRESSURE TEST COUPLING WITH SAFETY CAP, 7/16-20 UNF (SAE-4) WITH VITON O-RING
	13	4	7238X6 VITON	WORLDWIDE	HOLLOW HEX PLUG, STRAIGHT THREAD O-RING, 9/16-18 UNF (SAE-6)
	14	3	1/8-27 NPT	ALMO	NPT PLUG WITH .031 DRILL THRU, FOR REMOVABLE ORIFICE (SUPPLIED WITH MANIFOLD)
*	15	3	HDA4475-A-3000-000	HYDAC	PRESSURE TRANSMITTER, 4-20 mA, 0-3000 PSI
*	16	3	LFA25D-7X/FV/12	REXROTH	CONTROL COVER
	17	3	1/16-27 NPT	ALMO	NPT PLUG WITH .031 DRILL THRU, FOR REMOVABLE ORIFICE (SUPPLIED WITH MANIFOLD)

* RECOMMENDED SPARES

REVISION
B AS BUILT CHANGES MEW 8/01

TOLERANCES
DECIMAL .XX +/- .015
.XXX +/- .005
FRACTION +/- 1/32
ANGLE +/- 1/2 DEG
FABRICATION
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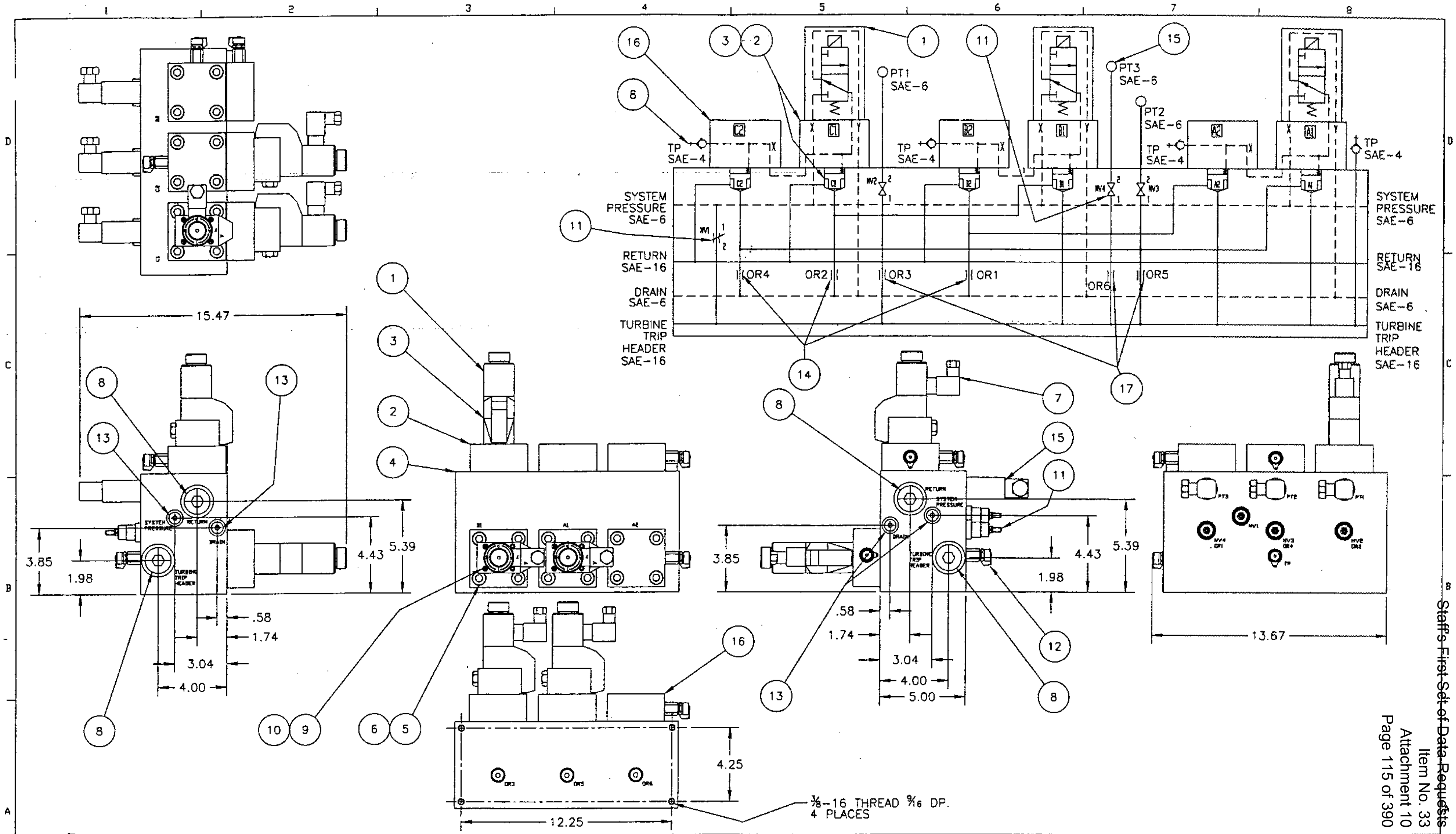
THIRD ANGLE PROJECTION

DATE: 1/22/01
ENGINEER: MEW
DRAWN:
APPROVED: TS
SCALE:

WESTINGHOUSE PROCESS CONTROL, INC.
A FISHER-ROSEMOUNT COMPANY

ET TESTABLE DUMP MANIFOLD
DRAWING TYPE: ASSEMBLY AND BILL OF MATERIAL
CUSTOMER: AMERICAN ELECTRIC POWER
MITCHELL PLANT - UNIT 1
JOB NUMBER: WJ867A
G5660TDMET0
REVISION B
SHT 2 OF 2



REVISION	
B	AS BUILT CHANGES MEW 8/01

TOLERANCES
DECIMAL .XX +/- .015
.XXX +/- .005
FRACTION +/- 1/32
ANGLE +/- 1/2 DEG
FABRICATION
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THIRD ANGLE PROJECTION

DATE: 1/22/01
ENGINEER: MEW
DRAWN:
APPROVED: TS
SCALE:

WESTINGHOUSE PROCESS CONTROL, INC.
A FISHER-ROSEMOUNT COMPANY

BFPT ET TESTABLE DUMP MANIFOLD
DRAWING TYPE: ASSEMBLY AND BILL OF MATERIAL

CUSTOMER:
AMERICAN ELECTRIC POWER
MITCHELL PLANT - UNIT 1

JOB NUMBER:
G5660TDMETB

REVISION B
SHT 1 OF 2

BILL OF MATERIAL

	ITEM	QTY	PART NUMBER	VENDOR	DESCRIPTION
*	1	3	M-3SEW6C3X/420MG24N9K4/V	REXROTH	SOLENOID VALVE, 24 VDC, DE-ENERGIZE TO TRIP
*	2	3	LFA25WEMB-7X/V/12	REXROTH	CONTROL COVER FOR MOUNTING DIRECTIONAL POPPET VALVE
*	3	6	LC25A05E7X/V	REXROTH	DIRECTIONAL POPPET TYPE VALVE
	4	1	14222	ALMO	CUSTOM CARTRIDGE MANIFOLD, 2-3 DESIGN, TESTABLE DUMP MANIFOLD
	5	12	1/2-13 UNC X 2	COMMERCIAL	HEXAGON SOCKET HEAD CAP SCREW
	6	12	1/2	COMMERCIAL	HIGH COLLAR LOCK WASHER
*	7	6	931-966-100	HIRSCHMANN	CABLE SOCKET, SELF ASSEMBLY FOR 24 VDC
	8	4	7238X16 VITON	WORLDWIDE	HOLLOW HEX PLUG, STRAIGHT THREAD O-RING
	9	24	#10-24 X 1 3/4	COMMERCIAL	HEXAGON SOCKET HEAD CAP SCREW
	10	24	#10	COMMERCIAL	HIGH COLLAR LOCKWASHER
*	11	4	NFCC-LCV	SUN HYDRAULICS	ADJUSTABLE NEEDLE VALVE
*	12	4	06007029/VITON	HYCON	PRESSURE TEST COUPLING WITH SAFETY CAP, 7/16-20 UNF (SAE-4) WITH VITON O-RING
	13	4	7238X6 VITON	WORLDWIDE	HOLLOW HEX PLUG, STRAIGHT THREAD O-RING, 9/16-18 UNF (SAE-6)
	14	3	1/8-27 NPT	ALMO	NPT PLUG WITH .031 DRILL THRU, FOR REMOVABLE ORIFICE (SUPPLIED WITH MANIFOLD)
*	15	3	HDA4475-A-3000-000	HYDAC	PRESSURE TRANSMITTER, 4-20 mA, 0-3000 PSI
*	16	3	LFA25D-7X/FV/12	REXROTH	CONTROL COVER
	17	3	1/16-27 NPT	ALMO	NPT PLUG WITH .031 DRILL THRU, FOR REMOVABLE ORIFICE (SUPPLIED WITH MANIFOLD)

* RECOMMENDED SPARES

REVISION		
B	AS BUILT CHANGES MEW 8/01	

TOLERANCES
DECIMAL .XX +/- .015
.XXX +/- .005
FRACTION +/- 1/32
ANGLE +/- 1/2 DEG
FABRICATION
UP TO 24 IN. +/- 1/8
OVER 24 IN. +/- 1/4

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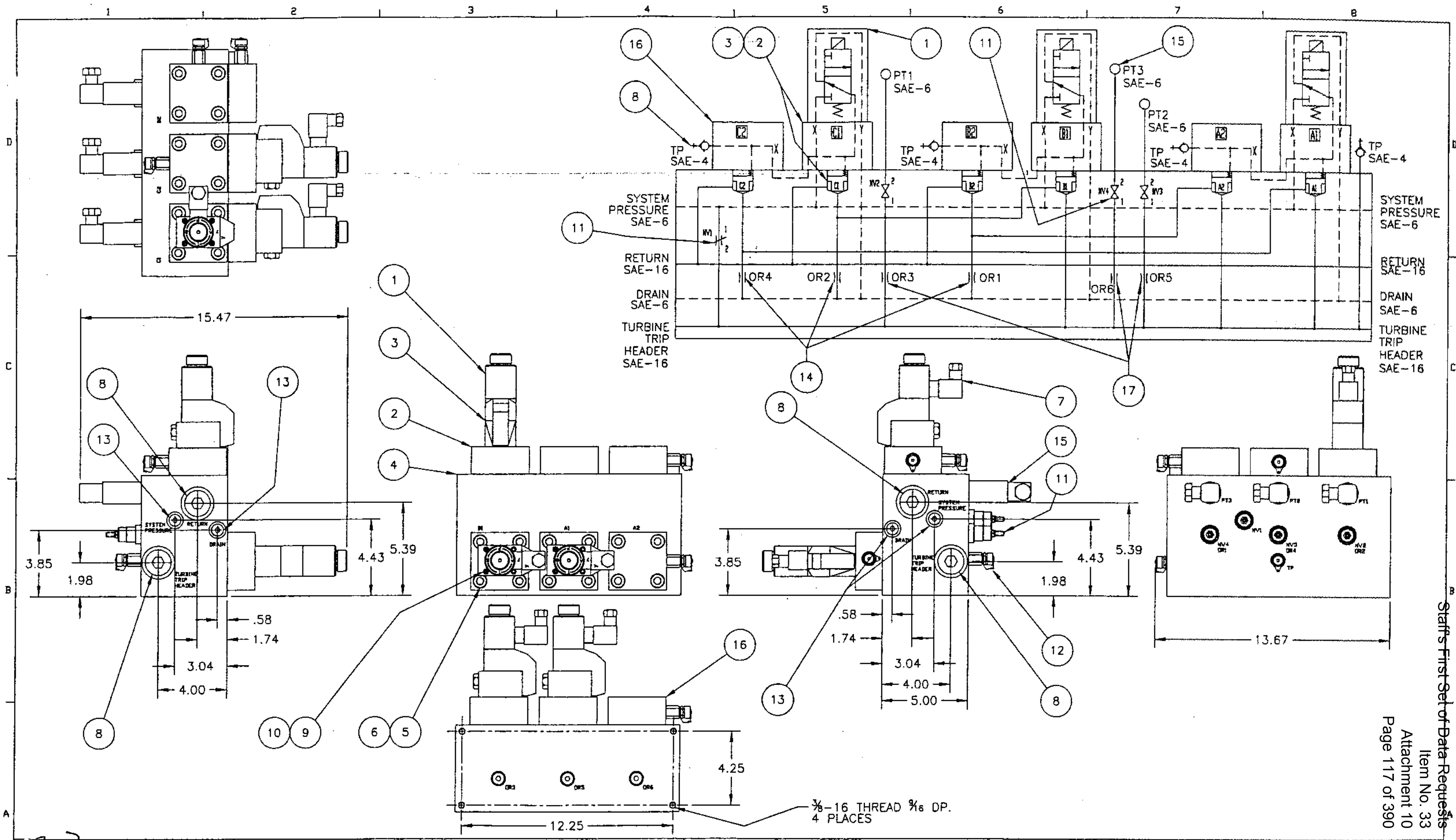
THIRD ANGLE PROJECTION

DATE: 1/22/01
ENGINEER: MEW
DRAWN:
APPROVED: TS
SCALE:

WESTINGHOUSE PROCESS CONTROL, INC.
A FISHER-ROSEMOUNT COMPANY

BFPT ET TESTABLE DUMP MANIFOLD
DRAWING TYPE: ASSEMBLY AND BILL OF MATERIAL
CUSTOMER: AMERICAN ELECTRIC POWER
MITCHELL PLANT - UNIT 1
JOB NUMBER: WJ8678
G5660TDMETB
REVISION B
SHT 2 OF 2



REVISION	
B	AS BUILT CHANGES MEW 8/01

TOLERANCES

DECIMAL .XX +/- .015
.XXX +/- .005
FRACTION +/- 1/32
ANGLE +/- 1/2 DEG
FABRICATION
UP TO 24 IN. +/- 1/8
OVER 24 IN. +/- 1/4

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THIRD ANGLE PROJECTION

DATE: 1/22/01
ENGINEER: MEW
DRAWN:
APPROVED: TS
SCALE:

WESTINGHOUSE PROCESS CONTROL, INC.
A FISHER-ROSEMOUNT COMPANY

OPC TESTABLE DUMP MANIFOLD
DRAWING TYPE: ASSEMBLY AND BILL OF MATERIAL
CUSTOMER: AMERICAN ELECTRIC POWER
MITCHELL PLANT - UNIT 1
JOB NUMBER: WJ867A
G5660TDMOPC
REVISION B
SHT 1 OF 2

BILL OF MATERIAL

	ITEM	QTY	PART NUMBER	VENDOR	DESCRIPTION
*	1	3	M-3SEW6C3X/420MG24N9K4/V	REXROTH	SOLENOID VALVE, 24 VDC, DE-ENERGIZE TO TRIP
*	2	3	LFA25WEMB-7X/V/12	REXROTH	CONTROL COVER FOR MOUNTING DIRECTIONAL POPPET VALVE
*	3	6	LC25A05E7X/V	REXROTH	DIRECTIONAL POPPET TYPE VALVE
	4	1	14222	ALMO	CUSTOM CARTRIDGE MANIFOLD, 2-3 DESIGN, TESTABLE DUMP MANIFOLD
	5	12	1/2-13 UNC X 2	COMMERCIAL	HEXAGON SOCKET HEAD CAP SCREW
	6	12	1/2	COMMERCIAL	HIGH COLLAR LOCK WASHER
*	7	6	931-966-100	HIRSCHMANN	CABLE SOCKET, SELF ASSEMBLY FOR 24 VDC
	8	4	7238X16 VITON	WORLDWIDE	HOLLOW HEX PLUG, STRAIGHT THREAD O-RING
	9	24	#10-24 X 1 3/4	COMMERCIAL	HEXAGON SOCKET HEAD CAP SCREW
	10	24	#10	COMMERCIAL	HIGH COLLAR LOCKWASHER
*	11	4	NFCC-LCV	SUN HYDRAULICS	ADJUSTABLE NEEDLE VALVE
*	12	4	06007029/VITON	HYCON	PRESSURE TEST COUPLING WITH SAFETY CAP, 7/16-20 UNF (SAE-4) WITH VITON O-RING
	13	4	7238X6 VITON	WORLDWIDE	HOLLOW HEX PLUG, STRAIGHT THREAD O-RING, 9/16-18 UNF (SAE-6)
	14	3	1/8-27 NPT	ALMO	NPT PLUG WITH .031 DRILL THRU, FOR REMOVABLE ORIFICE (SUPPLIED WITH MANIFOLD)
*	15	3	HDA4475-A-3000-000	HYDAC	PRESSURE TRANSMITTER, 4-20 mA, 0-3000 PSI
*	16	3	LFA25D-7X/FV/12	REXROTH	CONTROL COVER
	17	3	1/16-27 NPT	ALMO	NPT PLUG WITH .031 DRILL THRU, FOR REMOVABLE ORIFICE (SUPPLIED WITH MANIFOLD)

* RECOMMENDED SPARES

REVISION
B AS BUILT CHANGES MEW 8/01

TOLERANCES
DECIMAL .XX +/- .015
.XXX +/- .005
FRACTION +/- 1/32
ANGLE +/- 1/2 DEG
FABRICATION
UP TO 24 IN. +/- 1/8
OVER 24 IN. +/- 1/4

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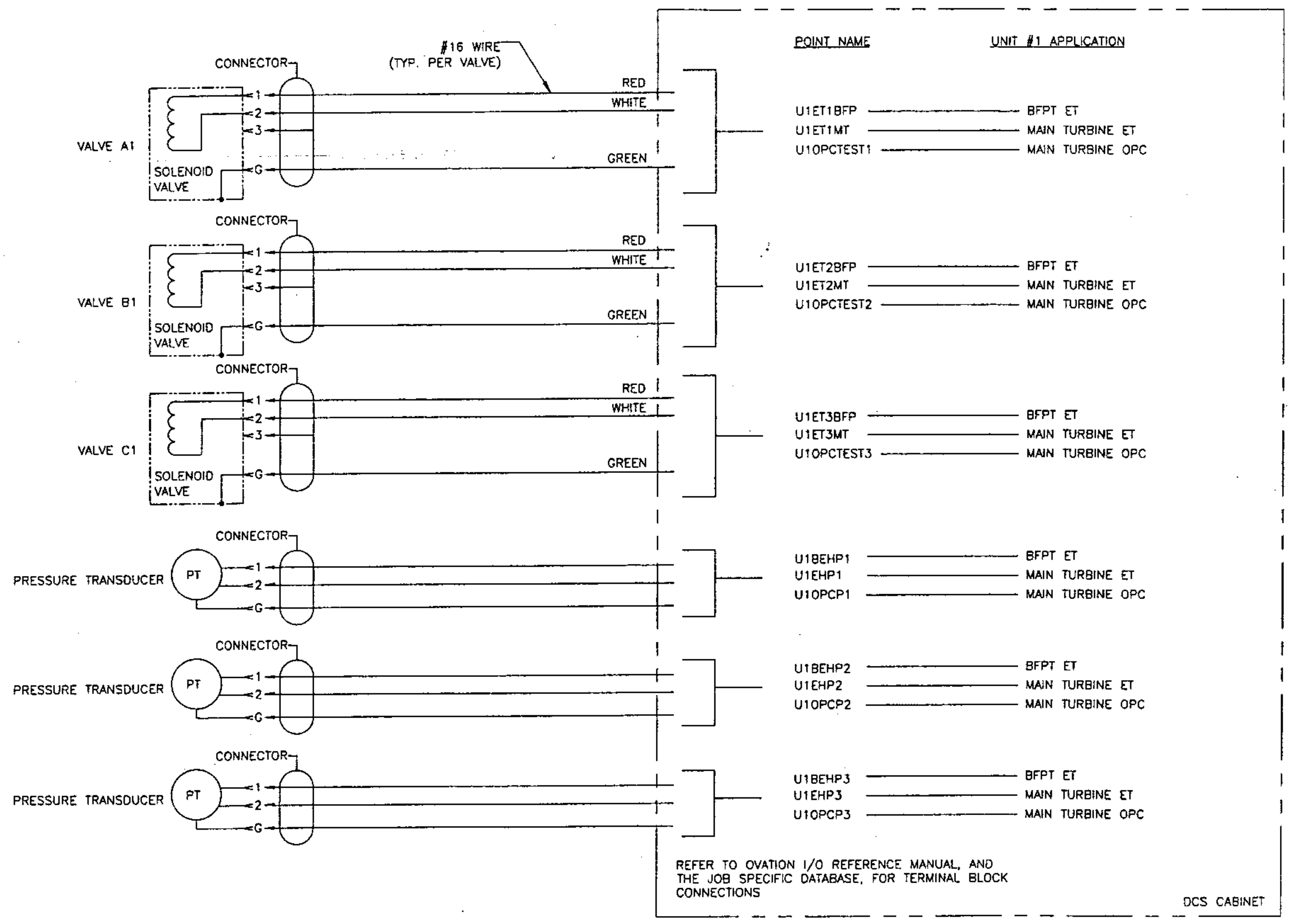
THIRD ANGLE PROJECTION

DATE: 1/22/01
ENGINEER: MEW
DRAWN:
APPROVED: TS
SCALE:

WESTINGHOUSE PROCESS CONTROL, INC.
A FISHER-ROSEMOUNT COMPANY

OPC TESTABLE DUMP MANIFOLD
DRAWING TYPE: ASSEMBLY AND BILL OF MATERIAL
CUSTOMER: AMERICAN ELECTRIC POWER
MITCHELL PLANT - UNIT 1
JOB NUMBER: WJ867A
G5660TDMOPC
REVISION B
SHT 2 OF 2



POINT NAME	UNIT #1 APPLICATION
U1ET1BFP	BFPT ET
U1ET1MT	MAIN TURBINE ET
U1OPCTEST1	MAIN TURBINE OPC
U1ET2BFP	BFPT ET
U1ET2MT	MAIN TURBINE ET
U1OPCTEST2	MAIN TURBINE OPC
U1ET3BFP	BFPT ET
U1ET3MT	MAIN TURBINE ET
U1OPCTEST3	MAIN TURBINE OPC
U1BEHP1	BFPT ET
U1EHP1	MAIN TURBINE ET
U1OPCP1	MAIN TURBINE OPC
U1BEHP2	BFPT ET
U1EHP2	MAIN TURBINE ET
U1OPCP2	MAIN TURBINE OPC
U1BEHP3	BFPT ET
U1EHP3	MAIN TURBINE ET
U1OPCP3	MAIN TURBINE OPC

REFER TO OVATION I/O REFERENCE MANUAL, AND THE JOB SPECIFIC DATABASE, FOR TERMINAL BLOCK CONNECTIONS

REVISION
B ADDED POINT NAMES MEW 8/01

TOLERANCES
DECIMAL .XX +/- .015
.XXX +/- .005
FRACTION +/- 1/32
ANGLE +/- 1/2 DEG
FABRICATION
UP TO 24 IN. +/- 1/8
OVER 24 IN. +/- 1/4

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THIRD ANGLE PROJECTION

DATE: 1/22/01
ENGINEER: MEW
DRAWN:
APPROVED: TS
SCALE:

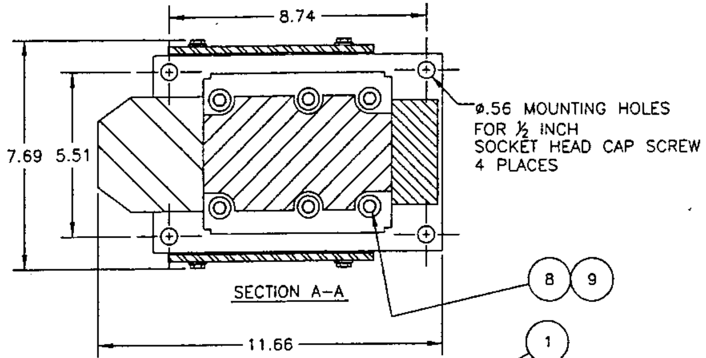
WESTINGHOUSE PROCESS CONTROL, INC.
A FISHER-ROSEMOUNT COMPANY

TESTABLE DUMP MANIFOLD

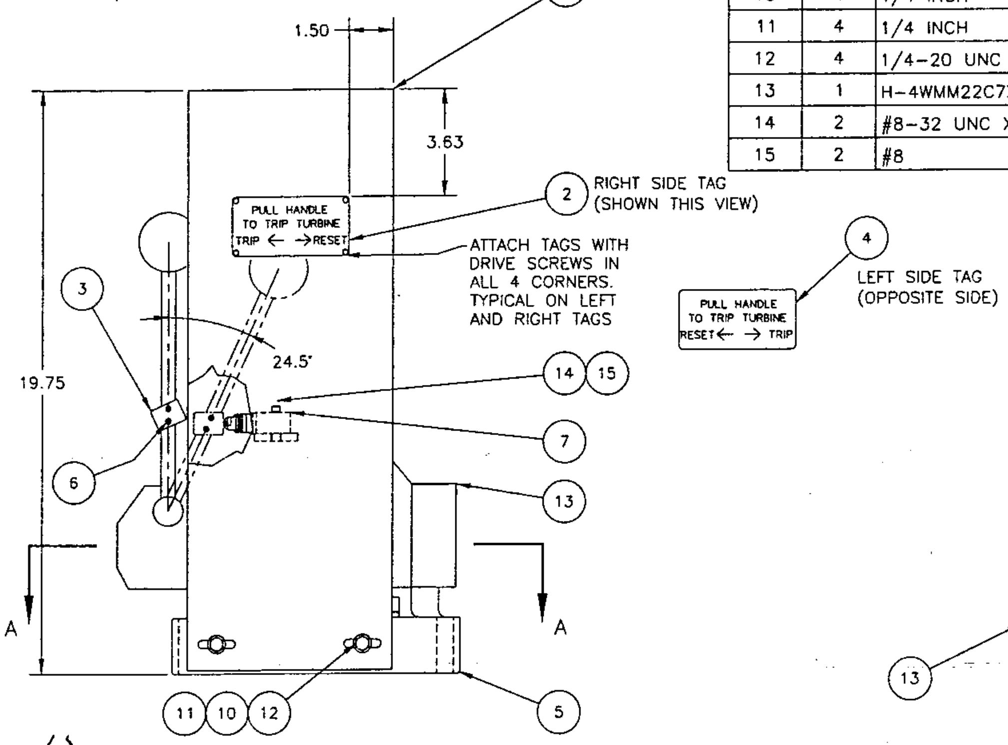
DRAWING TYPE: WIRING DIAGRAM
CUSTOMER:
AMERICAN ELECTRIC POWER
MITCHELL PLANT UNIT - 1
JOB NUMBER: G5660TDMEW0
REVISION B
SHT 1 OF 1

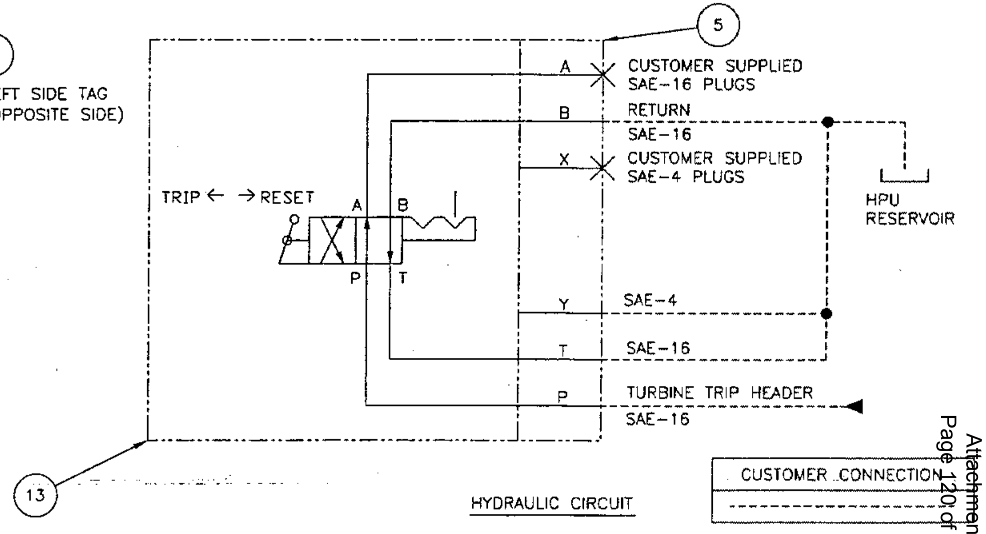
BILL OF MATERIAL

ITEM	QTY	PART NUMBER	VENDOR	DESCRIPTION
1	1	G5650LIMIT1	WESTINGHOUSE	LIMIT SWITCH COVER
2	1	G5660LIMIT2	WESTINGHOUSE	TRIP HANDLE TAG (RIGHT SIDE)
3	1	G5560LIMIT3	WESTINGHOUSE	TRIGGER
4	1	G5660LIMIT2	WESTINGHOUSE	TRIP HANDLE TAG (LEFT SIDE)
5	1	G5660LIMIT5	WESTINGHOUSE	SUB PLATE MODIFICATION
6	2	6-32 UNC X 1/4	COMMERCIAL	SOCKET SET SCREW, CUP POINT, STAINLESS STEEL
7	1	ZC-Q2155	OMRON	MICRO LIMIT SWITCH
8	6	1/2-13 UNC X 2 1/2	COMMERCIAL	SOCKET HEAD CAP SCREW
9	6	1/2 INCH	COMMERCIAL	HI-COLLAR LOCK WASHER
10	4	1/4 INCH	COMMERCIAL	FLAT WASHER
11	4	1/4 INCH	COMMERCIAL	HI-COLLAR LOCK WASHER
12	4	1/4-20 UNC X 5/8	COMMERCIAL	HEX HEAD CAP SCREW
13	1	H-4WMM22C7X/F/V	REXROTH	DIRECTIONAL VALVE
14	2	#8-32 UNC X 1 1/2	COMMERCIAL	SOCKET HEAD CAP SCREW
15	2	#8	COMMERCIAL	HI-COLLAR LOCK WASHER



SECTION A-A





HYDRAULIC CIRCUIT

CUSTOMER CONNECTION

REVISION		
B	ADDED HYD. CIRC.	RPN 8/01

TOLERANCES
DECIMAL .XX +/- .015
.XXX +/- .005
FRACTION +/- 1/32
ANGLE +/- 1/2 DEG
FABRICATION UP TO 24 IN. +/- 1/8
OVER 24 IN. +/- 1/4

PROPRIETARY DATA

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THIRD ANGLE PROJECTION

DATE: 6/15/01	WESTINGHOUSE PROCESS CONTROL, INC. A FISHER-ROSEMOUNT COMPANY	
ENGINEER: MEW	TRIP HANDLE ASSEMBLY DRAWING TYPE: BILL OF MATERIAL	
DRAWN:	CUSTOMER: AMERICAN ELECTRIC POWER MITCHELL PLANT - UNIT 1	JOB NUMBER: G5660LIMIT4
APPROVED: TS		
SCALE:	REVISION B	SHT 1 OF 1

Generator

Generator Rotor

The running generator rotor, S/N 73P475, was removed from the stator. The field was stored on site at Mitchell to be tested and repaired on site.

The spare generator rotor, S/N 79P030, was installed during the outage.

The spare rotor had previously went to ground in 1997. The rotor was repaired at ABB's service shop prior to the outage. The repairs to the rotor include the following.

The CE of the rotor shaft was cut off just inboard of the radial stud bore. A new shaft was welded on. All bearing fits, hydrogen seal fits, and coupling fits were machined to the as found sizes of the rotor. All coupling bolt holes were machined. The rotor was modified so that there is no longer hydrogen access to the bore plug.

New bore copper was installed and a new terminal stud was installed. The new terminal stud is a straight stud where the old terminal stud was a tapered stud.

The rotor was rewound using the existing copper and Nomex insulation. A short ring top tooth modification was performed and new 18-18 style retaining and zone rings were installed. The flux ring was removed.

The rotor passed all electrical tests. The rotor was high speed balanced and current was applied to ensure thermal stability. The rotor was returned to site well ahead of the outage.

Prior to installing the rotor, all rotor bearing journals, hydrogen seal journals, oil deflector fits, coupling fits and coupling bolt holes were visually inspected and measured for size. The generator bearings, oil seals, oil deflectors, and hydrogen seals all had to be reconditioned, see below for details.

The rotor was also tested electrically by Dan Shriver of Generator Engineering prior to installation. The rotor was then installed and the end bells/bearing/etc were assembled. The rotor was meggered numerous times after it was installed with no problems noted.

A summary of the work done at ABB's repair facility has been copied from ABB's report and included in this section.

Generator Stator

The generator stator was inspected by Dan Shriver of AEP Generator Engineering and Jerry Beasley of CMS. The end windings were inspected and showed little signs of greasing. The bushing box was inspected, the stator wedges were inspected, and the core bolts were checked for tightness. The stator wedges were checked for tightness by tapping and were very loose.

A complete rewedge was recommended by Dan Shriver. A Hi-pot test and El-Cid test were done prior to removal of the wedges. The stator passed both tests.

CMS winders removed the old wedges, cleaned and prepped the slots, and installed the new wedges. The wedges, filler strips, and ripple springs were procured from the Gund Co.

The inspection of the building bolts and the four through bolts revealed that the through bolts were properly torqued, but the building bolts needed to be tightened. Two of the building bolts were completely loose. These bolts were torqued by CMS winders.

After installation of the wedges and the core bolt torquing, the Hi-pot test and El-Cid tests were done again, and all tests were acceptable. CMS winders then painted the stator with insulating paint.

Reports / Memos from Dan Shriver and a report from Jerry Beasley of CMS are included in this section.

During one of the attempts at start-up, high conductivity

Generator - Mechanical Components

Hydrogen Seals

The hydrogen seal rings were in good condition visually, however due to journal size differences between the running field and the spare field to be installed, the hydrogen seal rings needed to be repaired.

Two spare sets of hydrogen seal rings were sent to RPM to be resized. The rings were rebabbitted and then machined to size providing design axial and radial clearances.

The hydrogen seal casing also had three sets of oil deflector teeth on each casing. The teeth were miced and compared to the new rotor sizes. One set of the seal teeth needed to be replaced for each hydrogen seal casing. The hydrogen seal casings were sent to RPM, and were retoothed on the oversized rows only. The other rows of teeth were used as found.

When installed, the hydrogen seal casing was aligned radially to the journals, with 0.006" clearance on the bottom and an even clearance on each side. When installing the hydrogen seal rings, it was noted that the TE seal ring was steel with a babbitt lining rather than the customary bronze with babbitt lining. After discussions with E. Chik of Westinghouse and J. Cable of AEP turbine engineering, it was decided that the steel rings should not be used. The bronze backed hydrogen seal rings that had been removed during disassembly were sent to RPM and resized to fit the spare rotor.

Both sets of hydrogen seal rings were installed, and the upper casings were installed. The hydrogen seal rings were checked for movement. The rings moved freely as per design.

During start-up, vibration data pointed to a hydrogen seal rub on the CE hydrogen seal. This area was reinspected. Please refer to generator addendum 1 and 2 for data on the hydrogen seal reinspection.

Generator Bearings

The generator bearings are labeled T-9 and T-10 bearings. Both bearings are Westinghouse style tilt pad bearings, with 4 bearing pads and a babbitted seal ring on both the inboard and outboard sides of the bearings.

Both bearings were in fairly good condition when disassembled, except that one of the upper bearing pads on T-9 bearing had some babbitt chipped out at the corners. Due to journal size differences with the spare rotor, both T-9 and T-10 bearings had to be repaired.

Both T-9 and T-10 bearings were sent to RPM for repairs. New mandrels were made by RPM for repairing the bearings. The lower pads were in good shape and were shimmed to close up the clearance. The upper pads were spin cast and machined to the proper contour.

The bearing seal rings for T-9 and T-10 all had acceptable bonding of the babbitt. All four seal rings were Tig weld repaired and machined to design clearances.

Both T-9 and T-10 bearings have an oil catcher seal attached to the outboard side of the bearings. These seals were retoothed at RPM and bored true to the bearings at a size to provide design clearances.
The insulation for the bearing ring pads was dried out and checked with a megger. The resistance was acceptable in all cases. The lower bearing was installed in the end bell, and the rotor was set in the bearings. The bearing was squared to the shaft and all twist and tilt measurements were taken. The bearing seal rings were installed, and the upper half of the bearings were installed.

The oil catcher seals were bolted on the bearing and aligned to the shaft such that their clearance was split concentric to the shaft. The bearing hold down pads were set with 0.012" to 0.016" clearance as per the instruction book.

Collector Shaft Bearing

The collector bearing is labeled T-11 bearing. It is a Westinghouse style tilt pad bearing, with 4 bearing pads and a babbitted seal ring on both the inboard and outboard sides of the bearing.

This bearing was new with the new collector skid and was not inspected during the outage. It was inspected during the start-up troubleshooting; see both the Hydrogen Seal Addendum and Generator Addendum.

Oil Deflectors

The generator oil deflector at T-9 was cleaned and inspected. It was in good condition and was reused as found.

Due to the change out of the exciter, the tunnel between the generator and exciter was completely removed. In place of the tunnel, a new oil deflector was installed. The new T-10 oil deflector was provided by Westinghouse. This oil deflector has bronze teeth.

Both oil deflectors were set with 0.006" clearance to the shaft on the bottom, with an even radial clearance on each side.

Gas Gap Baffles

There are 44 baffle rings for this generator. An axial reference was taken on the baffle rings prior to removal. The baffles were all removed to allow removal of the generator rotor.

The baffles were all cleaned and visually inspected after the field was removed. The baffles were then pressure tested. Fourteen of the baffles had minor cracks. These baffles were repaired with epoxy and insulating paint. Please note that there is a complete set of baffles available if needed, but were not used during this outage.

After the rotor was installed, the baffles were reinstalled. The baffles were locked in place and the axial position of the baffles was confirmed.

Blower

The blower and blower blades were removed from the generator in order to remove the generator rotor. The four blower housing sections were cleaned up and inspected. No problems were noted. All of the blower blades were inspected visually with no problems noted.

After the rotor was installed, the blower casing was aligned to the rotor. The clearances were checked and are recorded in this section.

Couplings

The coupling guard for "G" had a 2" hole in it when disassembled. It looked as if a balance weight had come loose and gone through the guard. The guard was sent to Shuttlers and the hole was patched.

The rabbet fit of the coupling and bull gear was measured and had the proper interference. All of the coupling bolts were measured, and the coupling bolt holes were also measured. The bolts had acceptable clearance to the bolt holes. There was some minor galling of the bolt holes, which was cleaned up.

The generator was aligned to the LP "B" rotor by making a side move on the stator. All centerline keys were resized and fit to the slots. "G" coupling was assembled and the coupling bolts were stretched to Westinghouse specifications. The turning gear standard was then built out.

The rabbet fit of "H" coupling was also checked. New coupling bolts were included as part of the new collector assembly. When tightening the coupling, one of the new bolts galled in the hole. The hole was cleaned up, but the bolt could not be salvaged. One of the old bolts was used in its place.

All of the bolts were torqued to Westinghouse specifications. New radial leads were also provided as part of the collector assembly. These radial leas were fit to the coupling with new insulators, locking nuts, and wedges across the radial leads. CMS provided two copper spacers to allow the radial lead wedges to be installed with the proper tightness.

End Bell

Both end bells were cleaned up prior to reinstallation. The new Dow Corning channel sealant was used to pump the end bells rather than using tite-seal. The Dow channel sealant requires the use of an air operated pump rather than using a grease gun. The pump was borrowed from Conesville Plant.

Air Test

An air test was performed on the generator after reassembly was completed. There was a bad leak along both of the 4-way joints between the end bell and hydrogen seal casing on the CE end bell. The air was bled off and the end bell was removed.

The corner of the end bell at both of these four way joints had been drug and was rounded really badly. A weld repair was done to both of the corners and ground flat by hand. The hydrogen seal casing was reinstalled using blue RTV as a sealant. A bead of blue RTV was also used at the 4-way joints between the end bell and hydrogen seal casing. The vertical joint bolts were also torqued 10% higher than the design torque values.

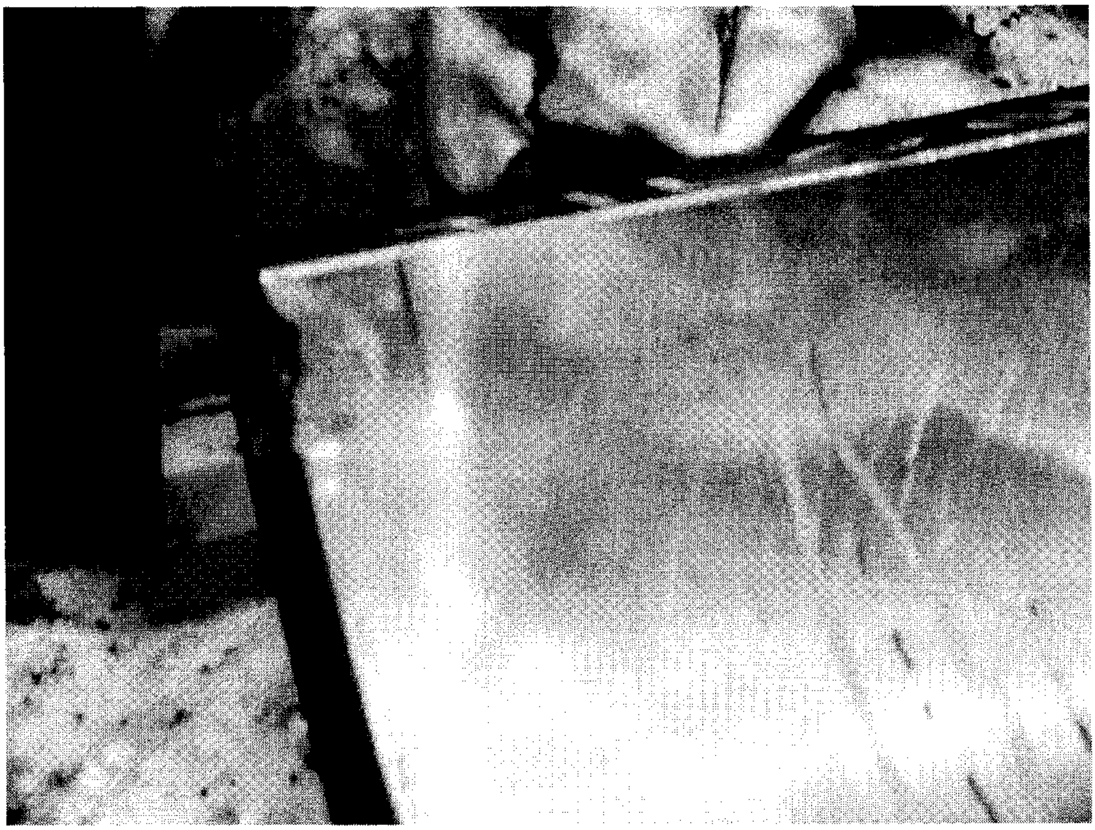
The air test was redone after assembly. The air was brought up to 40 PSI and was held for 12 hours. The air test was done with the unit off of tuning gear, which usually give a somewhat higher leakage rate. The plant management terminated the test after 12 hours due to schedule constraints. The equivalent leakage rates were between 450 and 500 cubic feet per day of hydrogen after the 12 hours.

It should be noted that operations decided to do the air test at 40 PSI even though the normal operating pressure of the machine is 70 PSI.

After the two start-up incidents where the hydrogen seals were revisited, the generator was aired up only long enough to snoop the generator. No real leakage drop test was done. No obvious leaks were noted during the snoop tests.

Mitchell Unit 1 – Generator Bearings

Fall 2001 Outage

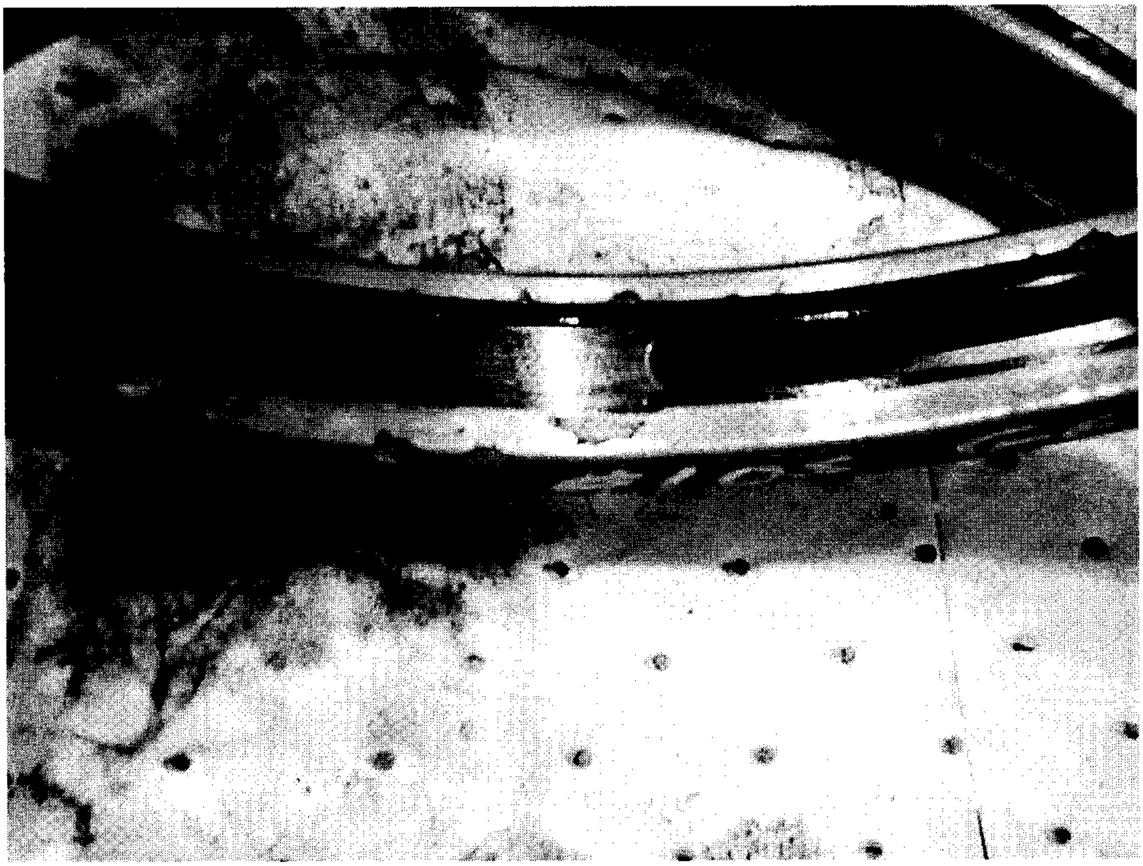


Comments:

This photo shows an upper pad from T-9 bearing. This bearing was repaired at RPM due to journal size differences associated with the generator rotor change-out.

Mitchell Unit 1 – Generator Bearings

Fall 2001 Outage



Comments:

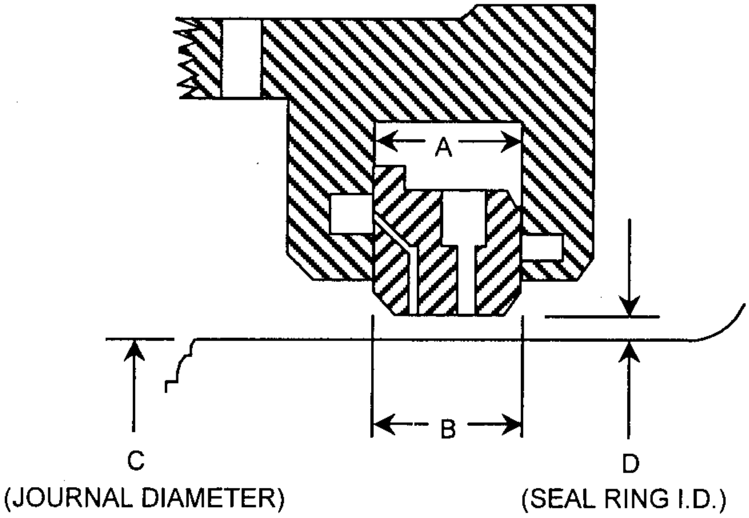
This photo shows the GE seal ring for T-10 bearing. T-10 bearing and both seal rings were repaired at RPM due to journal size differences associated with the generator rotor change-out.

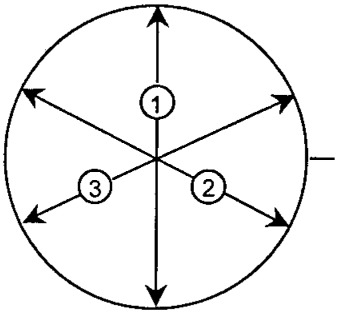
SIEMENS
WESTINGHOUSE

CUSTOMER: AEP	
LOCATION/UNIT #: MITCHELL 1	
GENERATOR HYDROGEN SEAL CLEARANCES	
BB/FRAME:	JOB NO.:
COMPONENT/S.O.: GENERATOR	DWG.:

Spare rotor # S/N 79P030

H2 seal ring EE





AXIAL CLEARANCES			
LOCATION	DIM A = GROOVE WIDTH	DIM B = RING THICKNESS	CLEARANCE
TOP	1.911	1.903	0.008
BOTTOM	1.911	1.903	0.008
RIGHT SIDE	1.911	1.903	0.008
LEFT SIDE	1.911	1.903	0.008

Design clearance: .0071/2 - .009

RADIAL CLEARANCES			
LOCATION	DIM C = JOURNAL	DIM D = RING I.D.	CLEARANCE
1	20.868	20.877	0.009
2	20.868	20.877	0.009
3	20.868	20.877	0.009

Design clearance: .009-.011 on diameter

FLATNESS CHECK	
Readings > 0.00"	LOCATION (IB/OB SIDE, DEG. FROM A.R. PIN)
	.0015 will not go anywhere at 8 locations checked

NOTE: This ring was replaced when repairing the hydrogen seal rub. See Generator Addendum II for final data.

FILE: GN001.PPT Rev. 02

As Found ___________ Reading Taken By: _____Downing / Vandyke___________ Date: _10/3/01____

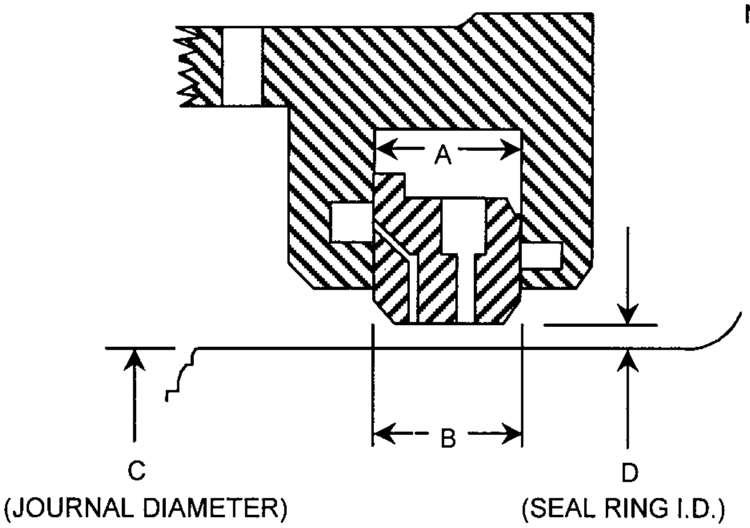
As Assembled _____X_____ Reviewed By (W) Eng.: ______________________________ Date: __________

SIEMENS
WESTINGHOUSE

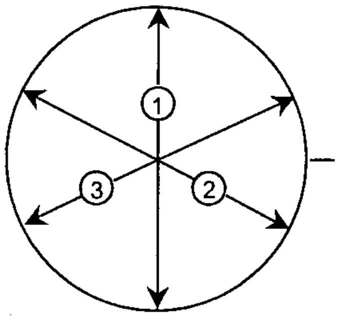
CUSTOMER:	AEP		
LOCATION/UNIT #:	MITCHELL 1		
GENERATOR HYDROGEN SEAL CLEARANCES			
BB/FRAME:		JOB NO.:	
COMPONENT/S.O.:	GENERATOR	DWG.:	

Spare rotor # S/N 79P030

Note: TE journal has step down for H2 seal



H2 seal ring TE



AXIAL CLEARANCES

LOCATION	DIM A = GROOVE WIDTH	DIM B = RING THICKNESS	CLEARANCE
TOP	1.8895	1.882	0.0075
BOTTOM	1.8895	1.882	0.0075
RIGHT SIDE	1.8895	1.882	0.0075
LEFT SIDE	1.8895	1.883	0.0065

Design clearance: .0071/2 - .009

RADIAL CLEARANCES

LOCATION	DIM C = JOURNAL	DIM D = RING I.D.	CLEARANCE
1	20.596	20.6035	0.0075
2	20.596	20.6035	0.0075
3	20.596	20.603	0.007

Design clearance: .009-.011
on diameter

FLATNESS CHECK

READINGS > 0.00"	LOCATION (IB/OB SIDE, DEG. FROM A.R. PIN)
	.0015 will not go anywhere at 8 locations checked

Tool # Used ______________________ Cal. Due Date __________

As Found __________ Reading Taken By: _____Downing ___________ Date: _10/11/01____

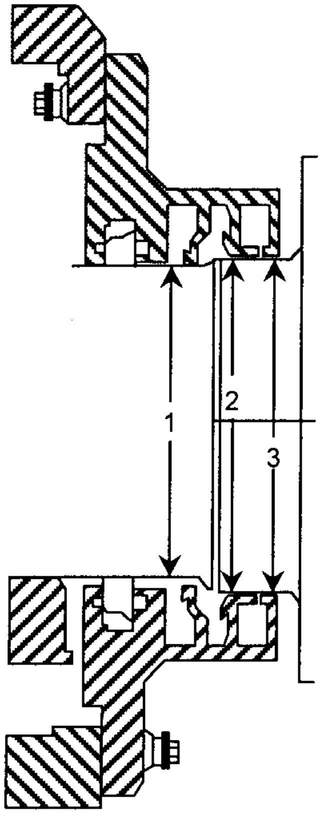
As Assembled _____X_____ Reviewed By (W) Eng.: ______________________ Date: __________

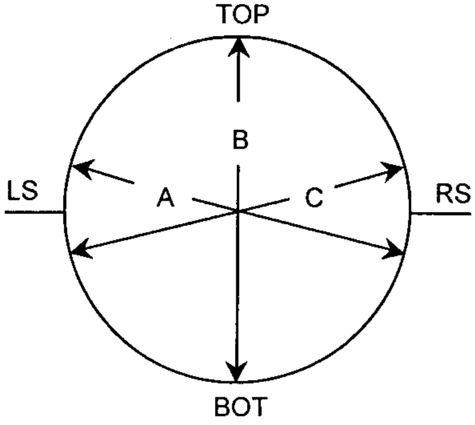
SIEMENS
WESTINGHOUSE

CUSTOMER: AEP
LOCATION/UNIT #: MITCHELL 1

GENERATOR CLEARANCES: LABYRINTH SEAL

BB/FRAME: JOB NO.:
COMPONENT/S.O.: GENERATOR DWG.:





Spare rotor TD 79P030

DIM. / END	A	B	C	Shaft OD	CLR
DIA. NO. 1 TE	20.821	20.821	20.821	20.756	0.065
DIA. NO. 2 TE	22.49	22.489	22.489	22.425	0.064
DIA. NO. 3 TE	22.495	22.493	22.495	22.425	0.069
DIA. NO. 1 EE	20.932	20.932	20.932	20.867	0.065
DIA. NO. 2 EE	22.516	22.515	22.515	22.455	0.060
DIA. NO. 3 EE	22.516	22.514	22.515	22.455	0.060

Design clearance : .066 - .070 on diameter

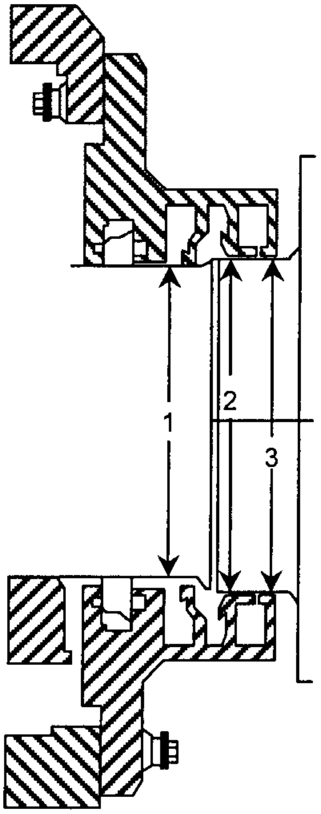
Teeth at Diameter No. 1 only re-toothed for both TE and EE hydrogen seal casings.
Retoothing of seal casings done by RPM Inc.

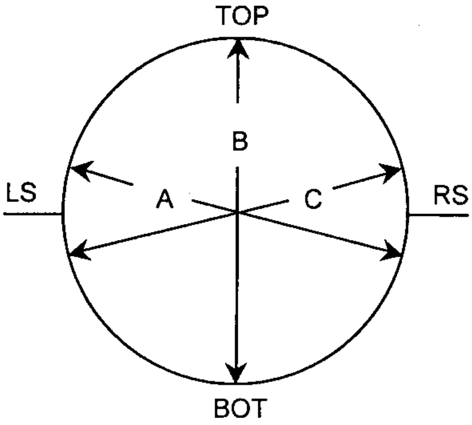
As Found ___________ Reading Taken By: _____ Dan Downing__ Date: _10/4/01____

As Assembled _____X_____ Reviewed By (W) Eng.: ________________________ Date: __________

SIEMENS
WESTINGHOUSE

CUSTOMER: AEP	
LOCATION/UNIT #: MITCHELL 1	
GENERATOR CLEARANCES: LABYRINTH SEAL	
BB/FRAME:	JOB NO.:
COMPONENT/S.O.: GENERATOR	DWG.:





Spare rotor TD 79P030

DIM. / END	A	B	C	shaft OD	CLR
DIA. NO. 1 TE	20.946	20.944	20.944	20.756	0.189
DIA. NO. 2 TE	22.491	22.49	22.49	22.425	0.065
DIA. NO. 3 TE	22.498	22.493	22.494	22.425	0.070
DIA. NO. 1 EE	20.948	20.949	20.949	20.867	0.082
DIA. NO. 2 EE	22.517	22.515	22.515	22.455	0.061
DIA. NO. 3 EE	22.515	22.514	22.514	22.455	0.059

Design clearance : .066 - .070 on diameter

Data – Hydrogen seal casings as found sizes compared to the spare rotor journal sizes. Both casings were shipped to RPM for repairs.

As Found __________

Reading Taken By: _____ Dan Downing__

Date: _9/14/01____

As Charted _____X_____

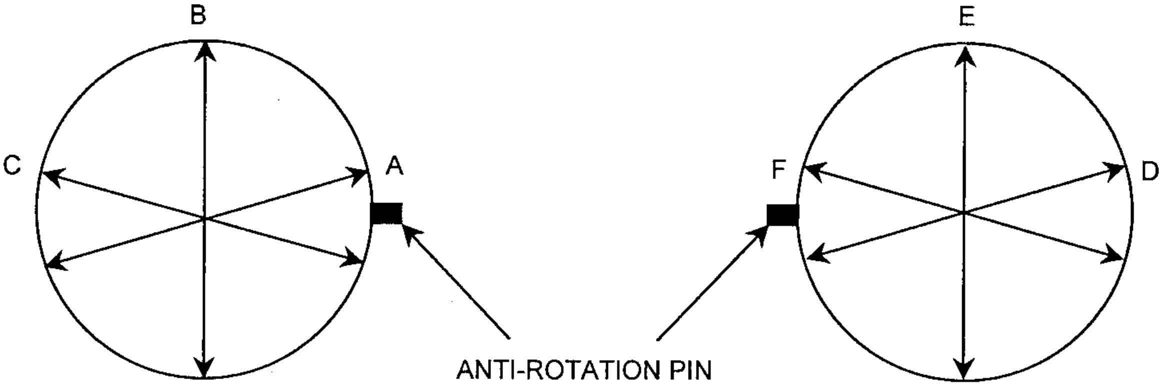
Reviewed By (W) Eng.: ______________________________

Date: __________

SIEMENS
WESTINGHOUSE

CUSTOMER:	AEP		
LOCATION/UNIT #:	MITCHELL 1		
GENERATOR BEARING SEAL RING			
BB/FRAME:		JOB NO.:	
COMPONENT/S.O.:	GENERATOR	DWG.:	

Spare rotor # S/N 79P030



BEARING NUMBER 9					
TURBINE SIDE		EXCITER END		CALCULATIONS	
POSITION	DIM.	POSITION	DIM.	AVG SHAFT O.D.	CLEARANCE
A	20.832	D		20.819	0.013
B	20.829	E		20.819	0.01
C	20.833	F		20.819	0.014

BEARING NUMBER 9					
TURBINE SIDE		EXCITER END		CALCULATIONS	
POSITION	DIM.	POSITION	DIM.	AVG SHAFT O.D.	CLEARANCE
A		D	20.836	20.819	0.017
B		E	20.831	20.819	0.012
C		F	20.832	20.819	0.013

Note: Design .012-.014 on diameter

Tool # Used ______________________ Cal. Due Date __________

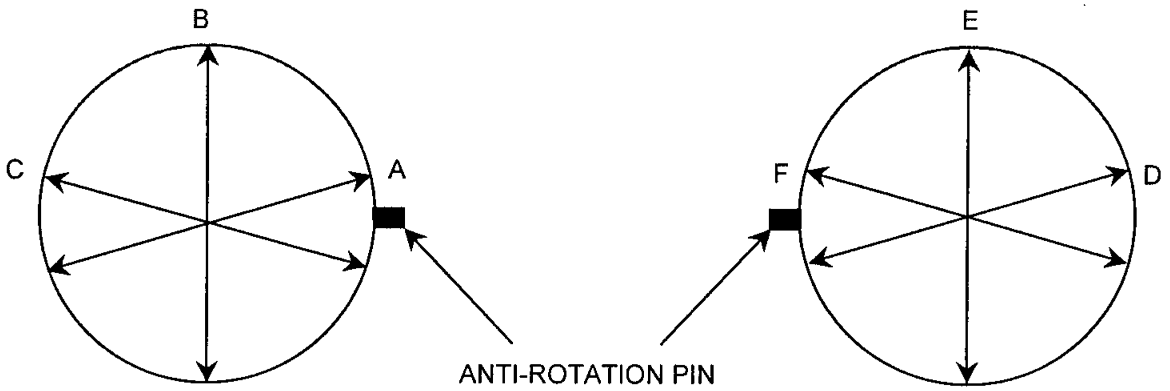
As Found __________ Reading Taken By: ______Downing / Vanduke__________ Date: __10/3/01___

As Assembled ____X______ Reviewed By (W) Eng.: ______________________ Date: __________

SIEMENS
WESTINGHOUSE

CUSTOMER: AEP	
LOCATION/UNIT #: MITCHELL 1	
GENERATOR BEARING SEAL RING	
BB/FRAME:	JOB NO.:
COMPONENT/S.O.: GENERATOR	DWG.:

Spare rotor # S/N 79P030



BEARING NUMBER 10					
TURBINE SIDE		EXCITER END		CALCULATIONS	
POSITION	DIM.	POSITION	DIM.	AVG SHAFT O.D.	CLEARANCE
A	20.884	D		20.868	0.016
B	20.8815	E		20.868	0.0135
C	20.8865	F		20.868	0.0185

BEARING NUMBER 10					
TURBINE SIDE		EXCITER END		CALCULATIONS	
POSITION	DIM.	POSITION	DIM.	AVG SHAFT O.D.	CLEARANCE
A		D	20.884	20.868	0.016
B		E	20.883	20.868	0.015
C		F	20.8815	20.868	0.0135

Note: Design clearance is 0.012" to 0.014" on the diameter.

NOTE: The bearing seal rings were later opened up by Shuttlers. See Generator Addendum III for final T-10 Bearing oil seal ring sizes.

As Found ___________ Reading Taken By: ______Downing ___________ Date: __10/3/01___

As Assembled ____X______ Reviewed By (W) Eng.: ______________________________ Date: __________

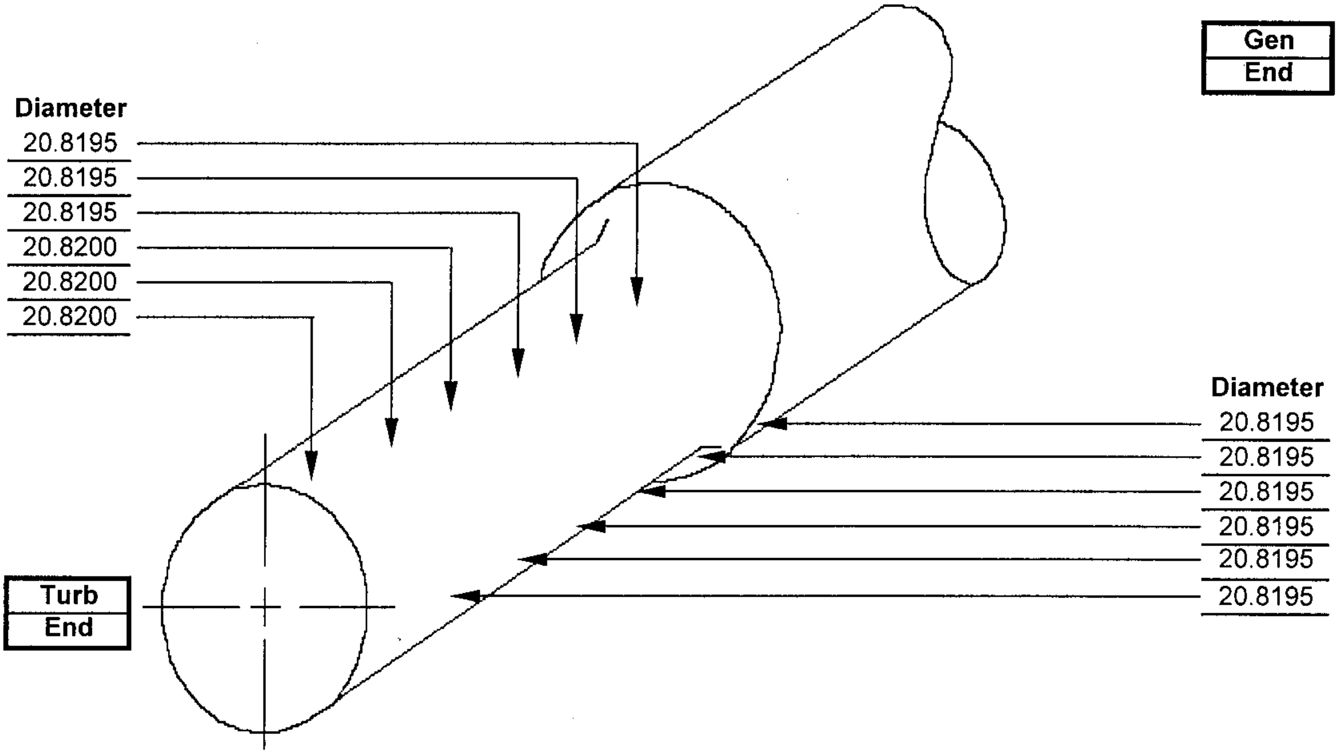
Rotor Journal Condition

Plant: ML
Unit 1
Turbine Serial No.

Date: 9/15/01
As Found/Final Final
Prepared by K. Riley

Journal Number T-9

Note: Mark on sketch to show grooving, discoloration, carbon inclusions, or irregularities in the journal surface.



Out of Roundness

Diameters		Out of Round
0°	90°	
20.8195	20.8195	0.0
20.8195	20.8195	0.0
20.8195	20.8195	0.0
20.8200	20.8195	0.5
20.8200	20.8195	0.5
20.8200	20.8195	0.5

Journal Sizes

	0°	90°	All
Maximum	20.8200	20.8195	20.8200
Minimum	20.8195	20.8195	20.8195
Difference	0.0005	0.0000	0.0005
Average	20.8198	20.8195	20.8196

Comments:

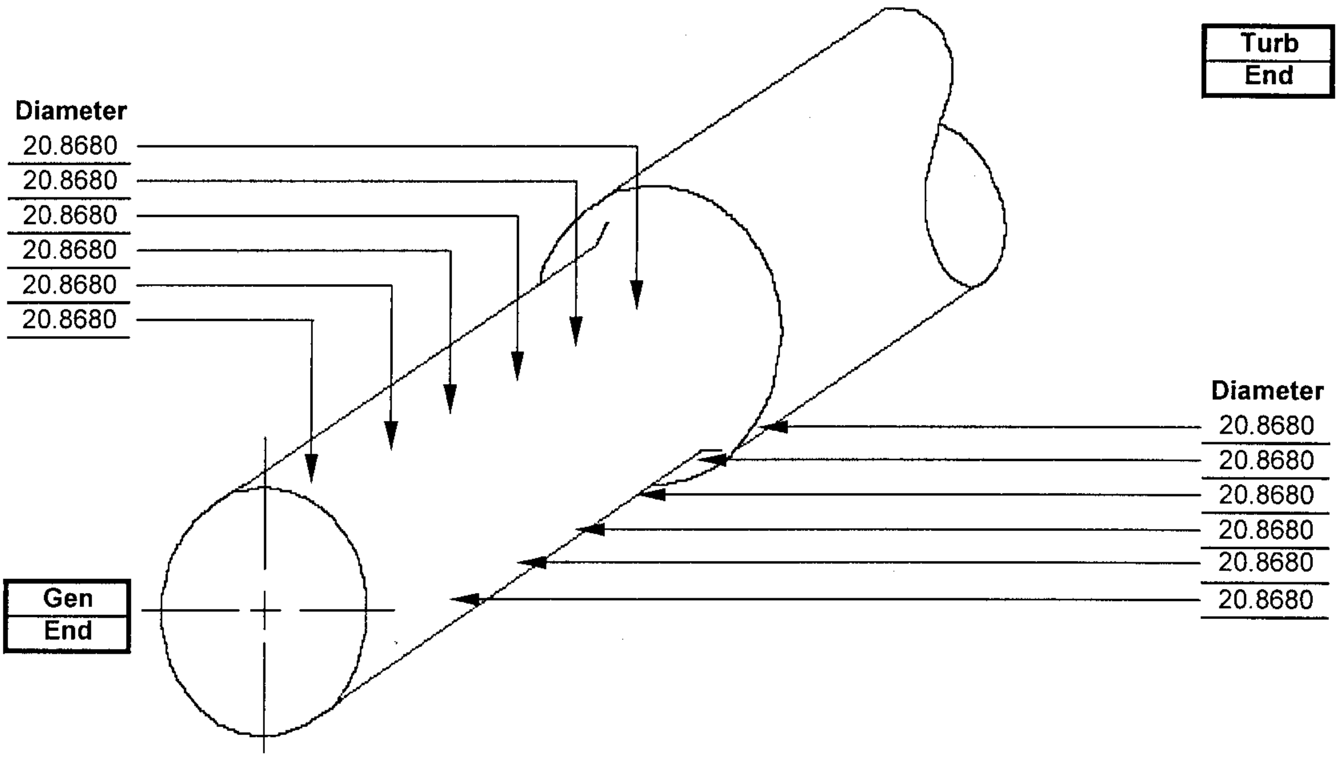
Rotor Journal Condition

Plant: ML Unit 1 Turbine Serial No.

Date: 9/15/01 As Found/Final Final Prepared by K. Riley

Journal Number T-10

Note: Mark on sketch to show grooving, discoloration, carbon inclusions, or irregularities in the journal surface.



Out of Roundness

Diameters 0°	Diameters 90°	Out of Round
20.8680	20.8680	0.0
20.8680	20.8680	0.0
20.8680	20.8680	0.0
20.8680	20.8680	0.0
20.8680	20.8680	0.0
20.8680	20.8680	0.0

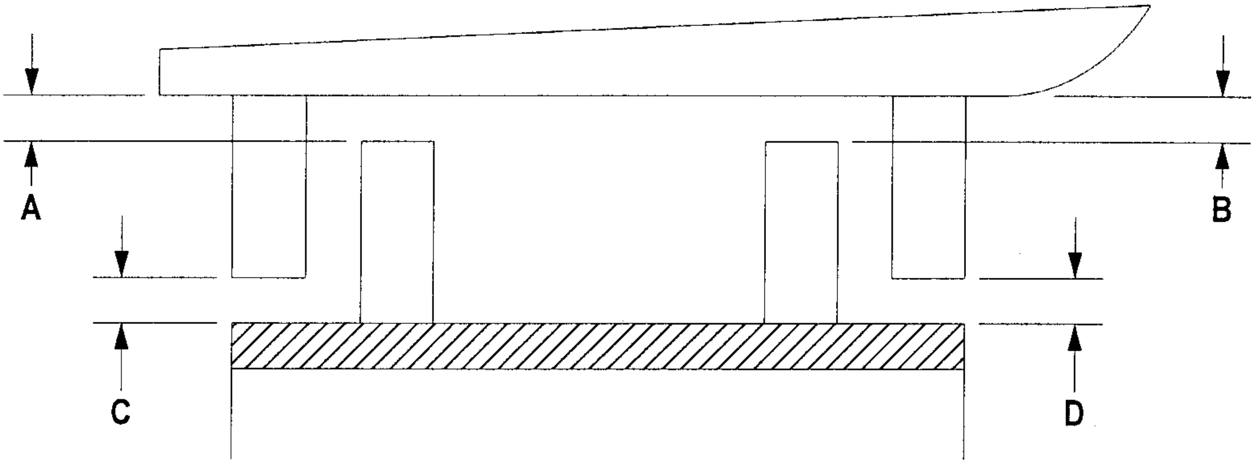
Journal Sizes

	0°	90°	All
Maximum	20.8680	20.8680	20.8680
Minimum	20.8680	20.8680	20.8680
Difference	0.0000	0.0000	0.0000
Average	20.8680	20.8680	20.8680

Comments:

Blower Blade Clearances

Date 10/12/01 Plant & Unit: ML #1 Prepared By: R. Vickers



As Found / Final Data: Final

Position				
Dim	Top Left	Top Right	Bottom Left	Bottom Right
A	0.129	0.089	0.074	0.063
B	0.130	0.088	0.082	0.062
C	—	—	—	—
D	—	—	—	—

Comments	

Oil Deflector Clearances

Generator Oil Deflectors

Plant & Unit ML 1

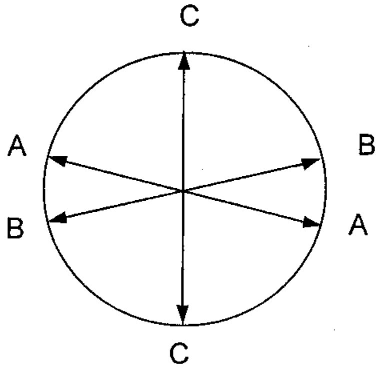
Prepared by D. Bordenkircher

Date(m/d/y) 9/26/01

As Found / Final Data Final

Turbine S/N:

INSPECTIONS & CHECKS				CODE	
Teeth Inspected	X			**X**	Work Carried Out
Journals Inspected	X			**N**	Not Done
				NA	Not Applicable
				C	See Comments
				V	Visual Inspection
				MP	Mag. Particle
				UT	Ultrasonic
				PT	Penetrant



Number	Location	Oil Deflector A-Dia	B-Dia	C-Dia	Journal Dia	Clearance Average	Min.	Max.	Condition Comment
TG	Turn Gear	19.057	19.035	19.050	18.997	0.050	0.038	0.060	Used as found
T-9	Gen - TE	21.978	21.994	21.985	21.949	0.037	0.029	0.045	Used as found
T-10	Gen - CE	13.070	13.069	13.066	13.000	0.068	0.066	0.070	New from Westinghouse

Comments:

Design Clearances: TG = 0.060" / T-9, T-10 = 0.068"

TILT PAD BEARING INSPECTION REPORT

JOB # 8929/34
AS SHIPPED
DATE 10/2/01

CUSTOMER/UNIT AEP / Mitchell Unit 1 Bearing # 9

CONDITION

LOWER ADJUSTING PLATE: Shimmed out as required

BABBITT: Upper pads spin cast repair lower pads shimmed out. Bearing ID bored to 20.861

MANDREL: 85%lower 100% upper contact to mandrel

BABBITTED SEAL RINGS: TIG weld repair and bored to 20.833"

ALUMINUM SEAL TEETH: Bored to 22.019, 20.889

COMMENTS:

TILT PAD BEARING INSPECTION REPORT

JOB # 8930/34
AS SHIPPED
DATE 10/2/01

CUSTOMER/UNIT AEP / Mitchell Unit 1 Bearing # 10

CONDITION

LOWER ADJUSTING PLATE: Shimmed out as required

BABBITT: Upper pads spin cast repair lower pads shimmed out. Bearing ID bored to 20.910

MANDREL: 85% contact to mandrel

BABBITTED SEAL RINGS: TIG weld repair and bored to 20.884"

ALUMINUM SEAL TEETH: Bored to 20.936, 21.995

COMMENTS:

Daniel D Shriver

09/24/01 02:06 PM

To: Wayne L Irons/OR3/AEPIN@AEPIN, Chester A Smith/CA1/AEPIN@AEPIN, Charles W George/CA1/AEPIN@AEPIN, Daniel J Sculley/OR4/AEPIN@AEPIN
cc: Russel W Gwin/CA1/AEPIN@AEPIN, Jack S Huggins/CA1/AEPIN@AEPIN, Carlton L Asbury/CH1/AEPIN@AEPIN, Jerry A Beasley/CH1/AEPIN@AEPIN, Kenneth H Adams/OR4/AEPIN@AEPIN, James H Cable/OR4/AEPIN@AEPIN, John J Lackner/LA1/AEPIN@AEPIN
cc: Russel W Gwin/CA1/AEPIN@AEPIN, Jack S Huggins/CA1/AEPIN@AEPIN, Carlton L Asbury/CH1/AEPIN@AEPIN, Jerry A Beasley/CH1/AEPIN@AEPIN, Kenneth H Adams/OR4/AEPIN@AEPIN, James H Cable/OR4/AEPIN@AEPIN, John J Lackner/LA1/AEPIN@AEPIN
Subject: Mitchell 1 Generator Inspection

Mitchell 1 generator was inspected on September 10 and 11, 2001 by Jerry Beasley of the Central Machine Shop and Dan Shriver of Mechanical Systems and Equipment Engineering (MS&EE). Rotor S/N 73P475 had been removed. The hydrogen coolers were in place. The bushing box was inspected via the box access cover.

September 13, 2001 the generator stator windings successfully withstood a 130% (1.3 x 26,000 vac = 33,800 vac) high potential test prior to the complete stator rewedge. Jerry Beasley, Central Machine Shop winders and RSO personnel assisted with the high potential testing.

September 17, 2001, Ken Adams (MS&EE) and Dan Shriver were on site to complete an El Cid test of the stator core, prior to the stator core tightening. Central Machine Shop winders assisted with the El Cid testing.

Inspection Details and Recommendations

Stator/ Bushing Box

Generally the stator windings were in excellent condition. No major areas of greasing were observed, in the stator endturns or the stator slots. Greasing in a generator is an indication of movement of a component against another item, when the generator is in service, The stator endturns were tight and in good condition. The Westinghouse Rigi-flex endturn support system is restraining the endturns adequately.

Generally the stator windings were dry and not oily. Their were three areas that were coated with turbine oil. They were the inside diameter of the turbine end of the stator windings outward from the second binding band, the outside diameter of the turbine end stator windings/ supports and in the bushing box. The bushing box had a large accumulation of oil in the pockets of the support steel and around the high voltage bushings.

Stator Wedges

The Mitchell 1 stator has 42 wedges per slot, with the wedges numbered 1-42, with number one at the collector end of the stator. Stator test wedges are at numbers 1, 3, 12, 21, 31, 40 and 42. The stator test wedges have seven holes for gaging the top ripple springs. The stator has 48 slots and a total of 2016 stator wedges. Fifty per cent of the stator test wedges were gauged. Several of the gauged test wedges were very loose and well beyond the recommended tightness levels. Tap testing of the stator wedges with a small test hammer revealed several very loose stator wedges. Greasing or dusting was not observed on any of the stator wedges. The lack of oil in the stator precludes greasing and reduces the movement of the stator wedges and coils. The recommendation was made to completely rewedge the stator based upon the fact several stator wedges were very loose and it has been seventeen years since the installation of the replacement stator. Most of the rewound generator stators on the AEP system have been scheduled for a complete stator rewedge, after this number of years of service. With the installation of the newly rewound rotor, with new 18-18 retaining and zone rings and a complete stator rewedge ,it should be ten years before the rotor requires removal for stator or rotor repairs.

Building and Through Bolts

The building and through bolts at the collector end were number from 1-32, in a clockwise direction, with number one at the one o'clock position. Two of the building bolts (numbers 6 & 11) at the collector end of the generator stator very loose and the washers behind the nuts were able to be turned by hand, with no resistance.

The turbine end building and through bolts were numbered 1-32, in a counter wise direction. One building bolt washer (number 11) at the turbine end was greasing.

No greasing or looseness of washers,bolts or nuts was observed on the through bolts.

Central Machine Shop winders checked the torqued on four through bolts at the collector end of the stator. These four through bolts were at the recommended torque/ tension values.

During the initial torque level on the building bolt nuts,several of the building bolt nuts turned three flats. The Central Machine Shop report will provide a complete listing of the number of flats the building bolt nuts turned at each of the three different torque levels.

A memo was provided to Jerry Beasley on September 18, 2001 with the recommended torque and tensioning levels for the building and through bolts for the Mitchell 1 generator. The following are the final values shown below. The torque levels on the building bolts were increased in three increments to the final torque value.

Torque Levels

Bolt	Final Toque (Dry)	Final Tension
Through	647 ft/lb **	31036 lb
Building	741 ft/lb	25393 lb

**Please note, the torque value supplied for the through bolts are for dry nuts and the Hytorc -Clamps nuts are lubricated with Dow Corning 1000 lubricant. The final tension value (31036 lb) for the through bolts should be looked up on the Hytorc T-1000 tension tool chart and the pump PSI used to tension the through bolts.

The through bolts are being torqued wet and the building bolts are being torqued dry.

Rotors

Rotor S/N 73P475 was removed and is stored on the turbine room floor under a plastic tent. Field S/N 73P475 is scheduled to have the bore copper replaced at the end of 2001. Replacement of the bore copper at the end of 2001 will allowed rewound rotor S/N 79P030 sufficient operate time to indicate it is a usable field.

Rotor S/N 79P030 was completely rewound with new insulation and existing copper by Alstom at their Richmond, Virginia repair shop. A new stub shaft was welded on the collector end of field S/N 79P030 by Alstom. The new stub shaft was installed to replace the collector end shaft that was damaged during the bore copper fault in December 1998. Alstom also installed new bore copper, insulting sleeve and studs during the collector end stub shaft replacement. The 18-5 retaining and zone rings were replaced with new 18-18 retaining and zone rings by Alstom during the repairs.

Mitchell 1 Generator Inspection Recommendations

Mitchell 1 generator should be inspected again in five to six years (2006-2007) with the rotor in place. This inspection can be completed by entering the collector end of the stator through the keystone access hole and the turbine end of the stator via the top left side access cover. This recommendation is based up proper operation of rewound field S/N 79P030.

Daniel D Shriver

10/04/01 01:08 PM

To: Wayne L Irons/OR3/AEPIN@AEPIN, Chester A Smith/CA1/AEPIN@AEPIN, Charles W George/CA1/AEPIN@AEPIN, Daniel J Sculley/OR4/AEPIN@AEPIN
cc: Russel W Gwin/CA1/AEPIN@AEPIN, Jack S Huggins/CA1/AEPIN@AEPIN, Carlton L Asbury/CH1/AEPIN@AEPIN, Jerry A Beasley/CH1/AEPIN@AEPIN, Kenneth H Adams/OR4/AEPIN@AEPIN, James H Cable/OR4/AEPIN@AEPIN, John J Lackner/LA1/AEPIN@AEPIN, Anthony F Hatem/LA1/AEPIN@AEPIN, Frank M Cerchiaro/CH1/AEPIN@AEPIN
Subject: Mitchell 1 Generator Stator Testing

Wednesday, October 3, 2001, Ken Adams and Dan Shriver of Mechanical Systems & Equipment Engineering were at Mitchell plant. The purpose of the trip was to complete an El Cid test of the stator core and high potential test of the stator windings of the Mitchell 1 generator. These tests were completed after the stator core tightening and complete stator rewedge by Central Machine Shop. The testing was completed with the assistance of the Central Machine Shop winders, Jim Imel, Robert Neel, Curt Pennington and Mong Thongteum.

The El Cid test of the stator core indicated the core was in acceptable condition after the torquing of the building and through bolts and the complete stator rewedge.

The stator windings successfully withstood a 120% (1.2 x 26,000 vac = 31,200 vac) high potential test.

Recommendations- High Potential Test

1. The temporary shorts and grounds installed on the stator RTD's and CT's for the stator high potential testing should be removed.
2. The generator neutral bus should be assembled and the cable connection to the neutral grounding transformer should be connected to the neutral bus.
3. The temporary feed for the high potential test set, from the welding breaker to the set should be removed. This piece of wire can be stored with the high potential test set for future testing. The high potential test set was prepared for storage after the testing was completed.
4. The two piece, General Electric, Kammer/ Mitchell high potential test set should be returned to it's normal storage area.

Generator Recommendations

1. Proper operation of the Mitchell 1 generator stator core monitor should be verified. Because of the core tightening and the complete rewedge of the stator, a small possibility exists that the stator core may experience problems during the start up of the generator. Operations personnel should be alert to alarms from the core monitor during start up of the generator, if a problem does develop in the core.

Copies of the high potential test data sheet will be forwarded to plant personnel via pony mail.

If you have any questions concerning this memo, please call Dan Shriver on 200-2138.

Daniel D Shriver

10/12/01 01:11 PM

To: Wayne L Irons/OR3/AEPIN@AEPIN, Chester A Smith/CA1/AEPIN@AEPIN, Charles W George/CA1/AEPIN@AEPIN, Daniel J Sculley/OR4/AEPIN@AEPIN
cc: Russel W Gwin/CA1/AEPIN@AEPIN, Jack S Huggins/CA1/AEPIN@AEPIN, Jerry A Beasley/CH1/AEPIN@AEPIN, Kenneth H Adams/OR4/AEPIN@AEPIN, James H Cable/OR4/AEPIN@AEPIN, John J Lackner/LA1/AEPIN@AEPIN, Anthony F Hatem/LA1/AEPIN@AEPIN, James E French/CA1/AEPIN@AEPIN, Larry E Fraleigh/CA1/AEPIN@AEPIN, Edward J Wingard/OR4/AEPIN@AEPIN, William E Tisher/CA1/AEPIN@AEPIN
Subject: Mitchell 1 Generator Rotor S/N 79P030 Testing

The following tests were completed on the Mitchell 1 generator field S/N 79P030 by Dan Shriver of Mechanical Systems & Equipment Engineering. These tests were completed on field S/N 79P030 while it was in the spare rotor storage building. Installation of generator field S/N 79P030 was started on Thursday, October 4, 2001.

Megger Testing

Test Date: September 12, 2001
Voltage Applied: 500 vdc
Ambient Temperature: 81° F
Megger Used For Testing: Biddle, Series 1, S/N G1303

Minutes	Megger Reading
1	2400 Megohms
2	3800 Megohms
3	4900 Megohms
4	5700 Megohms
5	6200 Megohms
6	7100 Megohms
7	7900 Megohms
8	8500 Megohms
9	9100 Megohms
10	9700 Megohms
Polarization Index, 10 Minute Reading / 1 Minute Reading	4.04

Impedance Test Of Rotor Windings

Expected Volts AC	Actual Volts AC Applied	Amps	Impedance
10	9.93	3.6	2.8
20	20.26	6.3	3.2
30	29.71	9.0	3.3
40	40.8	12.	3.4
50	50.2	14.4	3.5

Rotor Winding Resistance

A Biddle, Kelvin Bridge, Catalog Number 247000, S/N 3608 was used to measure the field winding resistance. A two volt auxiliary battery was used with the Kelvin bridge. Connections to the field windings were made at the collector ring studs with the large alligator clip test leads from Biddle.

Test Date: September 12, 2001
Winding Resistance @ 81° F (27.2°C): 0.0922 ohms
Winding Resistance @ 25°C: 0.0913 ohms

Test Date : September 13, 2001
Winding Resistance @ 82° F (27.8°C): 0.0921 ohms
Winding Resistance @ 25°C: 0.0911 ohms

The above resistances were corrected to 25° C with the following formula:

$R_2 / R_1 = (234.5 + t_2) / (234.5 + t_1)$ [A]

R_1 = Initial Temperature
R_2 = Resistance at New Temperature
t_1 = Initial Temperature
t_2 = New Temperature

[A] Mechanical Engineers Handbook
Fifth Edition, 1951
Lionel S. Marks
Page 1929

The following winding resistance which should be used in the calculations for the field temperature recorder: **0.0912 ohms @ 25°C.** This resistance is a average of the two measured resistances.

The Westinghouse factory winding resistance was located in the files for the Mitchell 1 spare generator field S/N 73P475. The resistance value given by Westinghouse is 0.0905 ohms @ 25°C.

If you have any questions concerning this memo, please call Dan Shriver on 200-2138.

MITCHELL PLANT
UNIT 1 GENERATOR
SEPTEMBER 10, 2001 TO OCTOBER 4, 2001

MANUFACTURE: Westinghouse
SERIAL # L/M 91P0959
907000 KVA; Stator Voltage 26000 at 20141 Amperes; 3600 RPM
Exciter Voltage 675 and Rotor Amperes 5090

Mitchell Plant
Unit 1 Generator
September 10, 2001 to October 4, 2001
PAGE 1

MANUFACTURE: Westinghouse
SERIAL # L/M 91P0959
907000 KVA; Stator Voltage 26000 at 20141 Amperes; 3600 RPM
Exciter Voltage 675 and Rotor Amperes 5090

Rewedge

A: Pre testing:

Dan Shiver, AEPSC tested the Unit 1 Generator. Each of the three phases of the stator windings withstood a 130% of voltage using an AC high potential test with the other two phases grounded. Dan Shiver and Jerry Beasley inspected the stator and recorded test measurement readings. Dan Shiver and Ken Adams, AEPSC performed an El Cid test on iron. See AEPSC reports.

B: Removal of wedges

All wedges and filler material were removed from unit.

C: Slot preparation:

The slots and coils cleaned with Acetone. Slots were painted with Glyptal 9921 green conductive paint. Silicone teflon tape .005" X 1.625" installed in each slot.

D: Cleaning

Bore and end turns were cleaned with Electron cleaner. Lower bushing box was oily. Cleaned bushing box thoroughly.

E: Installation of Wedges:

G-11 wedges were installed per CMS process # 1001. Coil jacks were used to seat coils at 100 lb. of pressure per square inch. The new filler material 0.90" & .062" thick x 1.625" wide was used as bottom filler. Various filler material was used from .015" to .032" as slides under wedges. Air-dry varnish was used between slides and filler. Ripple spring installed and wedge drove. Test wedge measurement taken and recorded. Sheets are attached. There are 48 slots of 42 wedges. Slot layout from EE end is:
End Herringbone wedge .430" x 2.063" x 7.375", .430" x 2.033" x 5.955", 5.990", 6.110"; 5.990", 5.990", 5.990", 5.990", 6.035", 5.830", 5.830", 5.850", 5.830", 6.035", 5.830", 5.830", 5.830", 5.940", 5.990", 4.400", 5.935", 5.990", 4.075", 5.990", 5.830", 5.830", 5.830", 5.940", 5.940", 5.830", 5.850", 6.170", 6.110", 5.870", 5.870", 5.870", 5.870", 5,870", 4.025", 5.825", 5.210", End Herringbone wedge .430" x 2.063" x 7.375".
Measuring wedges are end wedges #1 and #42; Body wedges # 3, 12, 21, 31, and 40.

F: Addition Work:

Stator

Torque:

Through bolts meggared at 1000 volts to ground and tested at 647 ft/lb by tension the stud bolt with 31036 lb at a psi of 2400 on pump. No through bolts were found to be loose. Meggered at 1000 volts to ground and all had an infinity reading. Building bolts were tightened to 741 ft/lb and the number of flats the nut turned was recorded.

Adjustable Band Rings:

Feeler gauge checks were performed on the Belleville washer gaps and all were below the excess of .100-inch gap.

G: Testing

Unit 1 GENERATOR

Generator testing performed by Dan Shiver, AEPSC. High potential tested at 120 % of voltage and El Cid. See AEPSC report for final data.

H: Cleaning and Painting.

Unit 1 was cleaned, wedges and bore painted using Dolph ER41 insulating paint.

J. A. Beasley
Production Supervisor
Central Machine Shop

AS TAKEN FROM ABB'S GENERATOR REPORT

SCOPE

This rotor experienced a bore copper failure while in operation. Upon examination by AEP and evaluation of repair alternatives, ALSTOM was selected to repair the rotor by replacing the non-drive end section with a new, welded on section.

The rotor was transported to ALSTOM's shop in Richmond, VA. The unit was disassembled for rewind and weld repair. The existing non-drive end section was removed and a new forging section welded on. The new section was machined to the existing outside diameters and a new, redesigned bore copper configuration. New bore copper and radial studs were installed. A modified, or "short ring" tooth top repair was performed on the rotor. The rotor was rewound with the existing copper, new 18-18 retaining rings and zone rings were installed. The rotor was initially rewound using a primarily fiberglass composite slot liner which failed during final testing. The rotor was subsequently rewound using a primarily Nomex® with fiberglass composite liner. Following the rewind, the rotor was high speed balanced and returned to Mitchell Station:

The following scope of work was performed:

- Unload rotor
- Visual inspection
- Perform incoming electrical tests:
  - Megger
  - Polarization Index
- Perform incoming runout inspection
- Visual inspection of:
  - Journals
  - Seal area

<u>Disassembly</u>

- Unshrink and remove major components:
  - Coupling
  - Blower hubs
  - Retaining rings
  - Gas spacer
  - Zone rings
  - Retaining ring face-plates
- Measure:
  - Retaining rings.

  - Zone rings.
  - Retaining ring faceplates.
  - Rotor body shrink seat area.
  - Winding head.
- Remove:
  - Slot wedges
  - Creepage blocks
  - Damper bars
  - Windings

Clean, Inspect and NDT Rotor Body

- Blast clean rotor body exterior
- Visually inspect rotor body exterior
- MT rotor body exterior and shaft ends

Replace Non-Drive End Section

- Sever rotor end inboard of radial stud bore
- Stress relief optimization test
- Machine weld prep for bore weld
- Weld build up bore
- Install zone ring for rolling surface
- Machine bore weld and joining weld prep
- Prepare new forging
- Pre-drill forging bore
- Weld prep the forging
- Assemble the forging and the rotor
- Preheat and weld the assembly
- Stress relieve the welded area
- UT and MT weld deposit
- Machine the bore
- Machine the shaft OD and coupling to the original configuration
- Machine radial stud bores and axial slots
- Machine coupling bolt holes

- MT bore and surface machining

- Machine drive end journal (squirrel cage method)

Clean, Inspect, Test Reusable Components

- Clean, inspect and prepare blower hubs.
- Clean, inspect and MT retaining ring face plates.
- Clean, inspect and MT coupling.
- Clean, inspect and MT gas spacer and components.

Machine Rotor Parts

- Machine blower hub modification
- MT blower hub machined sections for indications
- UT and PT new retaining ring forgings.
- UT and PT new zone ring forging.
- Premachine retaining ring forgings.
- Shrink original faceplates into new retaining rings.
- Finish machine new retaining rings.
- Finish machine new zone rings.
- PT new retaining rings.
- PT new zone rings.

Perform Tooth Top Repair

- Machine top teeth to remove rotor wedge lands while maintaining the original diameter and snap ring configuration
- MT machined sections for indications

Prepare for Rewind

- Manufacture and assemble new lead-in bar, prepare for installation and perform electrical test (megger, DC Hi-pot)
- Clean, visually inspect and provide new insulation for winding connectors and perform electrical test (megger, DC Hi-pot)
- Clean and inspect all winding turns
- Prepare for insulation application

Rewind Rotor

- Install new lead-in-bar assembly
- Install new radial studs and hardware
- Electrical tests on lead-in-bar, radial studs and winding connections only:
  - Megger
  - DC Hi-pot test
- Perform leak test on radial stud seals and bore plugs.
- Install copper coils using new slot and turn to turn insulation
- During the coil installation periodically perform the following electrical tests:
  - Megger
  - DC Hi-pot test
  - Pole balance
- Install creepage blocks
- Install damper bars
- Install wedges
- Install winding head blocking
- Install new retaining ring insulation
- Perform electrical tests

Mechanical Reassembly

- Install new zone rings
- Install new retaining rings
- Perform the following standard electrical tests before and after each retaining ring:
  - Megger
  - Polarization index
  - Pole balance
  - Recurrent surge test
- Install gas guide
- Install blower hubs
- Install coupling, axial pins, and anti-rotation pins

Machining After Assembly

- Machine coupling OD, spigot and loading face

- Perform final runout check.

High Speed Balance w/Heat Runs

- Prepare rotor for high speed balance
- Install temporary slip ring shaft
- Install rotor in test facility
- Pre-balance rotor
- Balance at operating speed
- Document critical speeds
- 10% over speed test for one minute
- Perform the following running electrical tests:
    - DC Resistance
    - Running AC impedance test
    - Flux probe test
    - Running megger test
- Perform two heat runs to test for thermal stability
- Map balance weight locations
- Remove rotor from test facility
- Remove temporary slip ring shaft

Prepare rotor for shipment

- Prepare rotor for final tests.
- Perform final electrical tests :
    - Polarization Index
    - AC hi-pot
    - Megger
    - Pole balance.
    - Recurrent surge test.
- Secure and lock all fasteners, balance weights, locking devices.
- Paint rotor
- Pack rotor for short term storage
- Load rotor for shipment

The following new components were provided for this project:

- Retaining rings
- Zone rings
- Retaining ring insulation
- Slot insulation
- Turn-to-turn and end turn insulation
- Lead-in-bar assembly
- Radial studs and radial stud hardware
- Radial stud seals
- Bore plug

RECOMMENDATIONS

GENERAL

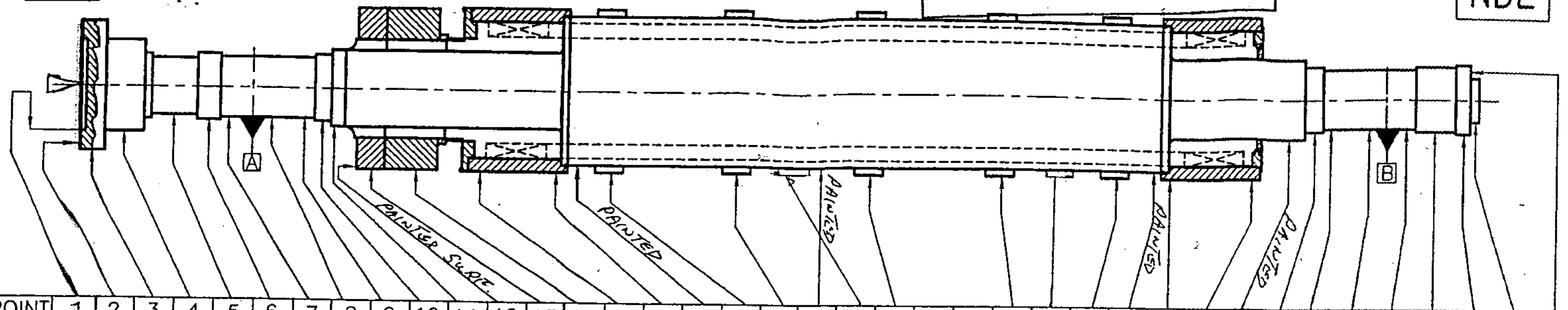
- Routine inspection of the rotor in accordance with the OEM's instructions is recommended.
- The unit is capable of operation in accordance with the OEM's instructions.

REF:

REVIEWED BY ENGINEERING
SIGNATURE: Jamonte
DATE: 00-07-13
Return original to Quality Control

DE

NDE



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2				1	3	½	½	½	0	0	4	0	5	2	0	9	8	5	0	21
3				3	2	0	0	½	0	0	4	4	5	7	0	0	9	8	5	27
4				4	1	½	0	0	0	½	4	24	5	7	25	9	6	0	10	21
5				5	1	0	½	0	0	1	2	54	4	6	53	27	3	4	13	14
6				4	0	0	½	0	½	1	1	84	2	7	73	10	2	1	14	8
7				3	0	0	½	½	0	½	0	86	1	7	70	4	1	5	15	3
8				0	1	½	1	0	0	0	0	56	0	0	54	6	0	3	10	0

POINT	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39
1	6	3			7	23	0	0	9	15	1	½	0	0	½	2½	8	6	½
2	5	1			0	16	14	1	4	10	0	½	½	0	½	3	9	6	0
3	7	4			3	8	11	5	0	22	0	½	0	½	1	3	7	6	½
4	10	0			10	0	3	8	4	22	1	0	0	½	½	3	6	4	1
5	19	6			25	23	6	9	5	11	2	½	0	0	½	2	6	3	1
6	12	10			18	40	8	10	3	0	1	1½	½	0	0	0	4	1	2
7	9	10			15	41	10	7	3	6	0	1½	½	½	0	½	0	0	2½
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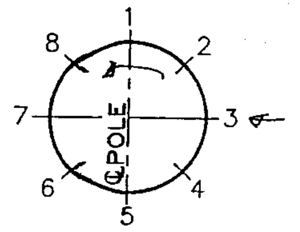

View from DE

RUNOUT PROCEDURE:
QAD-DWP-10.1.5

TYPE OF RUNOUT:
☐ INITIAL
☒ FINAL

- ALL READINGS ARE DIRECT DIAL INDICATOR READINGS x 0.01mm.
- SET-UP:(▼SHOWS SUPPORT POINTS)

ENG. DEPT. SIGN-OFF:

DRIVEN FROM
DE w/CARDAN
SHAFT ON MKD

Customer: AEP
Unit #: Mitchell
Job #: 1330230
Measured by: Andy Downing
Date: 7-13-00

ORIGINAL

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PREPARED: WPIETRUS 96-07-12	CHECKED:	APPROVED:	TMD CHK: STD. CHKD:
DERIVED FROM:	SUPERSEDES:		SUPERSEDED BY:
Revision: Prepared: / Checked: / Approved: / Std. Chkd:	Scale NTS Cadd File No. E30411-1	Format B	Language E Parts List: Separate Yes ☐ / No ☒
ABB POWER GENERATION INC.	Title STANDARD WE Rotor with Zone Rings Rotor Runout	Dept. Resp. TSD-ENG Drawing No. UTGE300411	Sheet No. 1 No. Sheets 1 Rev.

M:\WORKING\STANDARD\WE-MEAS\E30411-1.DWG

Mitchell Unit 1

Generator Addendum I

During start-up, two balance runs were made that brought T-10 and T-11 bearings (CE of generator plus collector bearings, respectively) DOWN to trip level vibration. The turbine was rolled again to 3600 RPM and held at that speed to test the static excitation system. High vibration was still noted at T-10 and T-11 bearings, but the unit was brought on line. At 80 MW, the high vibration still existed at T-10 and T-11 bearings, plus high water conductivity was also noted.

The unit was brought off line to inspect the cooling water system. After inspecting the stator cooling water skid and then degassing the generator, tags were hung on the generator electrical system, stator water system, and generator gas system.

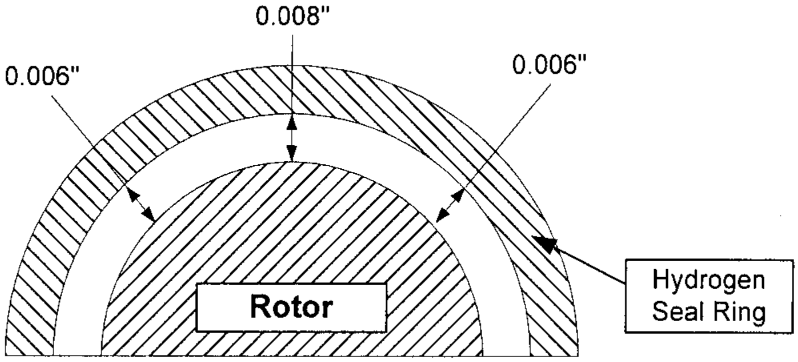
Three access covers to the generator were removed. A fixture was made to pressurize the stator water lines with an inert gas. All of the clip joints and hoses were checked for water leaks, and none were found. The equalizing line between the inlet and drain of the stator water was inspected. This line runs across the top middle of the inside of the generator frame. The line had a hole in it where it was clamped to a support. The equalizing line was weld repaired.

This equalizing line has also leaked during a previous outage. It should be replaced at the next end winding inspection. It is a stainless steel line.

The stator water lines were repressurized and did not leak.

At this point, it was decided to inspect the hydrogen seals to ensure that they had adequate clearance. This was done without removing the end bell.

The T-10 upper oil seal was removed, the T-10 bearing and bearing seals were removed. The plug to the CE hydrogen seals was removed and the movement of the seals was confirmed. Feeler gages were inserted between the CE hydrogen seal ring and the shaft as shown below.



The hydrogen seal ring moved freely with the feeler gages still between the seal and the shaft, so the clearance was confirmed.

The TE and CE bearing seals were also inspected. The CE bearing seal was in good condition, but the TE bearing seal had been rubbed slightly. The TE bearing seal was cleaned up with scotch brite and reused.

The T-10 oil deflector was aligned to the shaft when installed with 0.006" clearance between the teeth and shaft on the bottom and even clearance on each side. All components were reinstalled.

The oil deflector for the turning gear was also reset to the shaft. This time it was set concentric rather than with a smaller clearance on the bottom.

The Bentley Nevada service rep also reset the vibration probes at T-6 bearing, T-8 bearing, and T-10 bearing at this time. The rotor runout was checked at each journal where the probes were reset.

The unit was then released for start-up again.

Mitchell Unit 1

Generator Addendum II

During start-up, there was a lot of vibration at T-10 and T-11 bearings. While on line at 700 MW, the vibration would continually cycle up to 10 mils and back down to 7 mils over the span of 90 minutes. Jim Cable of turbine engineering noted that this type of vibration is indicative of a hydrogen seal rub.

When the turbine was removed from service for the strainer outage, it was decided to investigate the CE hydrogen seal ring. Prior to removing the unit, a spare TE hydrogen seal was repaired at Cincinnati Babbitt, and a spare CE hydrogen seal was repaired at RPM.

The seal oil system, generator gas system, generator electrical system, and the turning gear were all tagged out. A blank was installed in T-10 bearing feed line. The doghouse was removed, the coupling guard was removed, the upper half of the CE end bell, upper half of T-10 bearing and seal rings, and upper half of T-10 oil deflector were unbolted and removed.

The hydrogen seal casing was unbolted and removed. All disassembly checks noted in Westinghouse OMM 125 were done during disassembly, including the gland alignment check, ring freedom of movement check, axial and radial clearance checks, and gland casing squareness checks.

The rotor runout was checked and was less than 0.001". During the runout checks, a mechanical noise was heard coming from the rotor near the retaining ring. An investigation was done to determine the cause of the noise, and is discussed in the attached memo by Dan Shriver of generator engineering.

The hydrogen seal ring was then inspected according to OMM 125. Some of the items that were noted during this inspection:

- There was heavy scoring on the air side sealing face of the lower half of the hydrogen seal ring, but no scoring on the upper half.
- The seal ring was miced and found to be out of round by 0.009". The side readings were 0.004" tighter than when the ring had been installed, and the vertical readings were 0.005" open when compared to the assembly readings.
- The dowel pin hole on the horizontal joint was cracked to the side of the hydrogen seal ring. When assembled, the dowel caused the area of the crack to swell up by 0.004", which severely compromises the axial clearance.
- The seal ring passed a flatness check.
- A minor rub was noted on the hydrogen seal ring, but no material had been removed.
- Then seal teeth showed signs of rubbing on the shaft, but the teeth only had minor rubs on them.

The T-10 bearing seal rings were inspected and had acceptable axial and radial clearance and flatness. The T-10 bearing was resquared to the shaft.

The spare hydrogen seal ring for the CE was inspected. The axial clearance was checked, the radial clearance was checked and the flatness was checked. All checks were within OEM design limits. The spare hydrogen seal ring was repaired by RPM by building up the air side seal face with babbit.

During disassembly, the squareness test showed that the hydrogen seal casing was tilted at the top by 0.010". The vertical face was cleaned up and a dry test was done with no gasket. This test showed that the casing was tilted by 0.002". The seal casing was installed using the gasket and tit-seal, and the best tilt that could be achieved was 0.007" out of square with the rotor. The hydrogen seal casing was removed from the end bell and sent to CMS. At CMS, the vertical face was machined on a tilt by machining 0.010" from the top and 0 on the bottom.

The hydrogen seal casing was reinstalled. The casing seal teeth were aligned to the rotor. The casing was then squared to the rotor. The axial and radial clearances of the seal ring were confirmed with feeler gages. A megger test was done to confirm the insulation of the seal ring.

The upper half of the end bell was reinstalled. The weight of the rotor was removed from the bearing. The vertical faces of the upper and lower half of the end bell were lined up. The end bell and hydrogen seal casing were torqued per Westinghouse procedures.

The upper half of T-10 bearing and the bearing seal rings were installed. The clearance between the bearing and hold down bracket was set at 0.013".

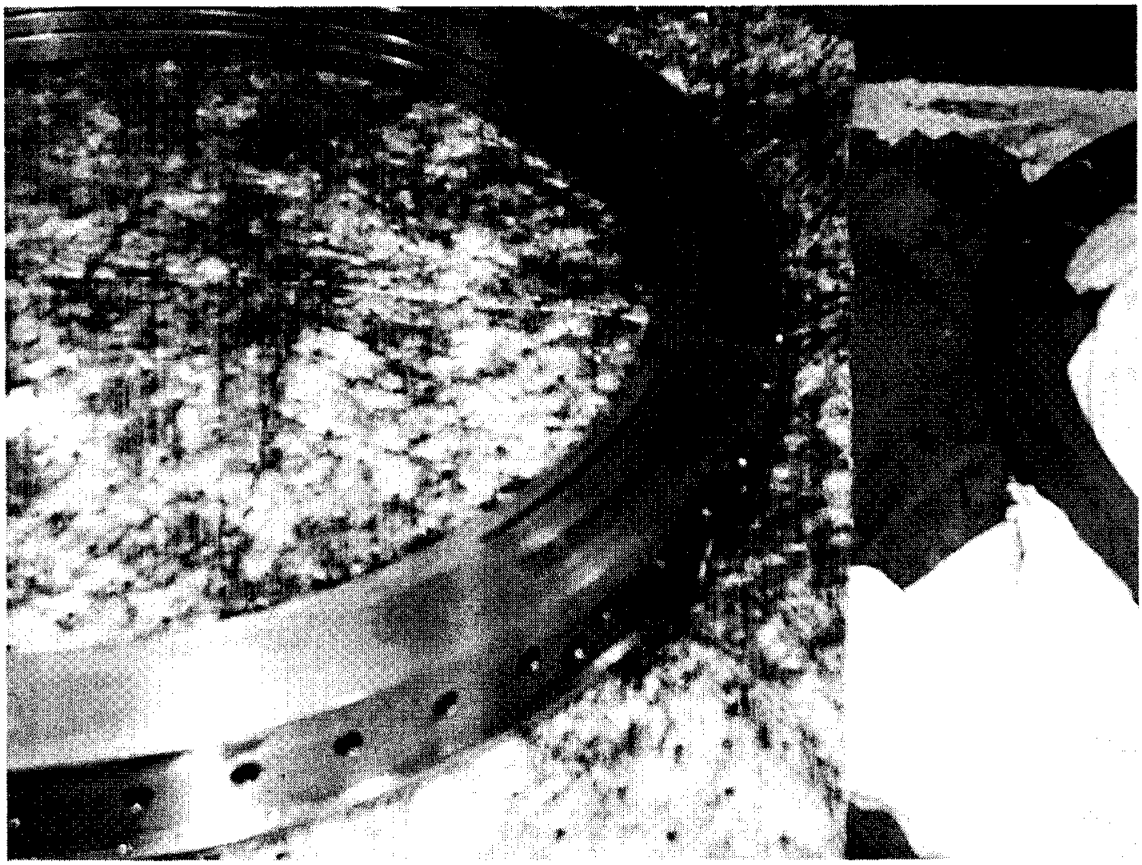
An air test was done for about ½ of an hour with enough time to snoop the components that had been removed. No leaks were noted. (It did leak the first time at the 4-way joint, but this was repaired and there were no leaks on the final assembly).

The upper half of T-10 oil deflector was reinstalled, and the doghouse and coupling guard were reinstalled. The turbine was maintenance released at this time. Note that the collector rings were cleaned and the brushes were changed out due to a minor oil leak.

One other inspection was done during this mini-outage. During the start-up, the vibration probes indicated that T-10 journal was raising 0.025" out of the bearing. This would have had an adverse effect on T-11 bearing, since T-11 bearing only had 0.014" clearance. To check this, we removed the upper half of T-11 bearing and both the TE and CE T-11 oil deflectors. The oil deflectors showed signs of rubbing and some plastic and wood had to be cleaned off of the shaft. T-11 bearing was in excellent condition and all were reassembled.

Mitchell Unit 1 – Generator

Fall 2001 Outage

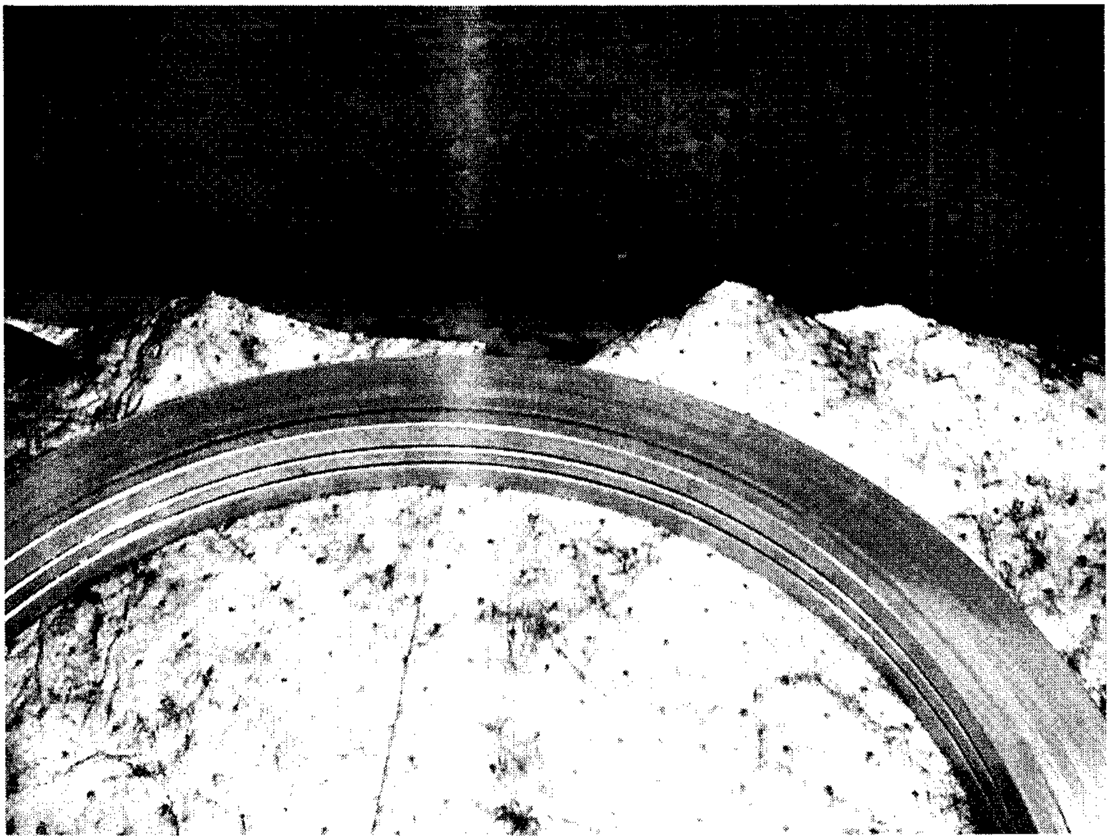


Comments:

This photo shows the CE hydrogen seal ring as inspected after the unit was shut down to correct the hydrogen seal rub. The seal ring showed scoring on the face as shown and also had a slight rub which can not be seen in this photo.

Mitchell Unit 1 – Generator

Fall 2001 Outage

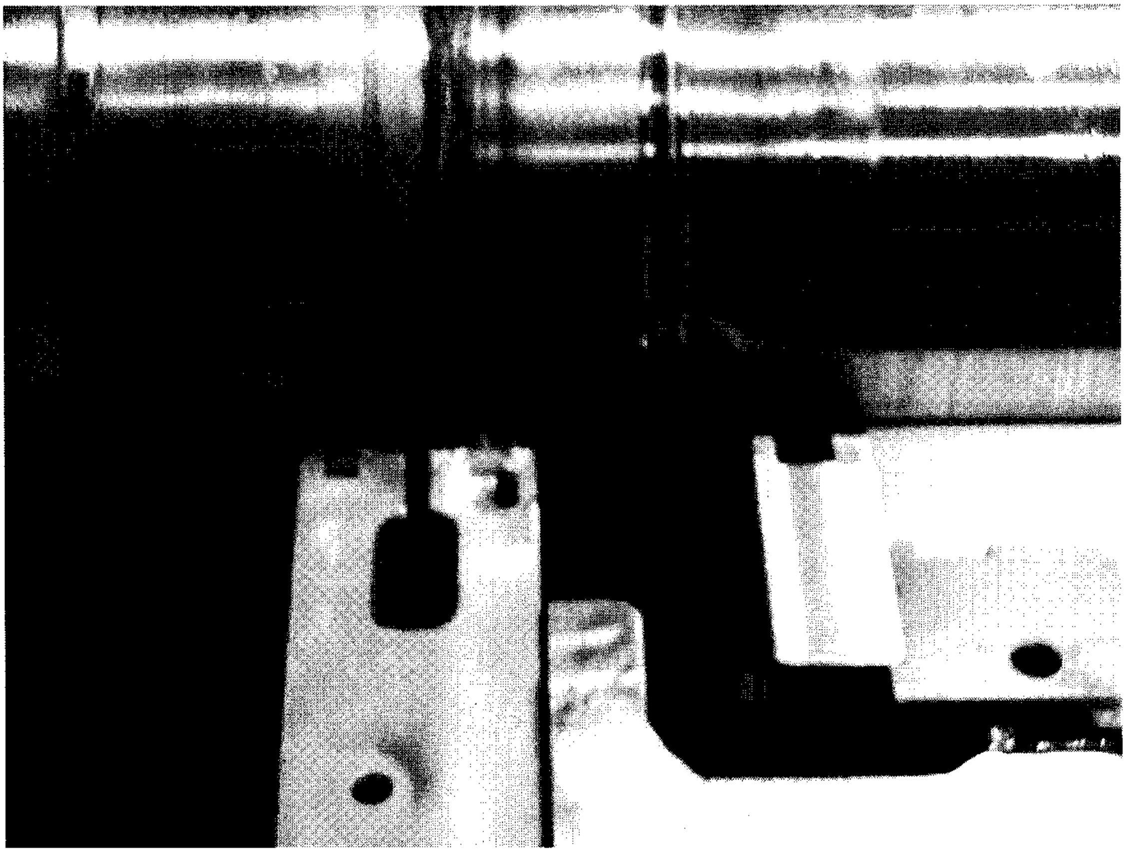


Comments:

This photo shows the CE hydrogen seal ring as inspected after the unit was shut down to correct the hydrogen seal rub. The seal ring showed scoring on the face as shown and also had a slight rub which can not be seen in this photo.

Mitchell Unit 1 – Generator

Fall 2001 Outage

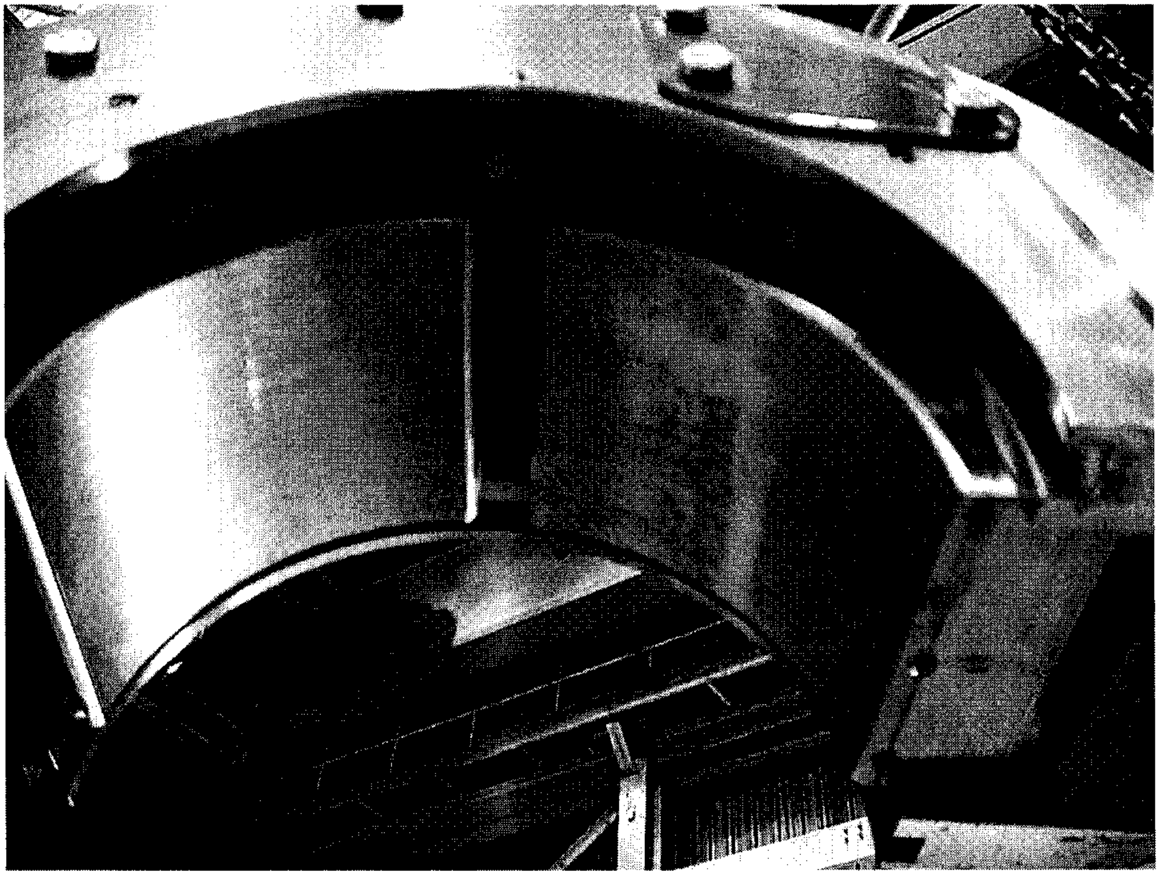


Comments:

This photo shows the collector shaft at T-11 oil deflector. It was inspected after the heavy vibration was noted during start-up, and the unit was shut down to correct a hydrogen seal rub. The red marks on the shaft are paint and the black marks are thought to be from either the oil deflector teeth or a fish stick used in gathering vibration data.

Mitchell Unit 1 – Generator

Fall 2001 Outage



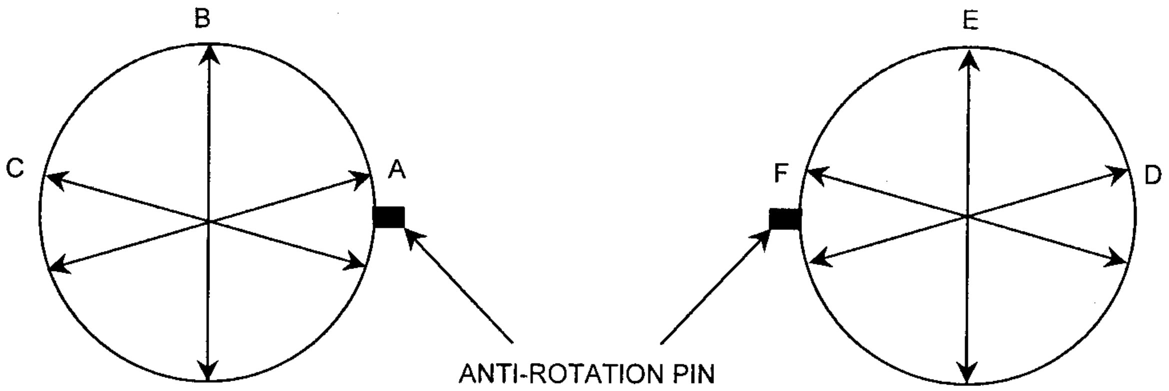
Comments:

This photo shows the T-11 bearing. It was inspected after the heavy vibration was noted during start-up, and the unit was shut down to correct a hydrogen seal rub. No damage was noted during the inspection.

SIEMENS
WESTINGHOUSE

CUSTOMER:	AEP
LOCATION/UNIT #:	MITCHELL 1
GENERATOR BEARING SEAL RING	
BB/FRAME:	JOB NO.:
COMPONENT/S.O.: GENERATOR	DWG.:

Spare rotor # S/N 79P030



BEARING NUMBER 10					
TURBINE SIDE		EXCITER END		CALCULATIONS	
POSITION	DIM.	POSITION	DIM.	AVG SHAFT O.D.	CLEARANCE
A	20.882	D		20.868	0.014
B	20.888	E		20.868	0.020
C	20.889	F		20.868	0.021

BEARING NUMBER 10					
TURBINE SIDE		EXCITER END		CALCULATIONS	
POSITION	DIM.	POSITION	DIM.	AVG SHAFT O.D.	CLEARANCE
A		D	20.885	20.868	0.017
B		E	20.884	20.868	0.016
C		F	20.8855	20.868	0.0175

NOTE: The bearing seal rings were later opened up by Shuttlers. See Generator Addendum III for final T-10 Bearing oil seal ring sizes.

As Found ________ Reading Taken By: ______K. Riley__________ Date: __11/23/01___

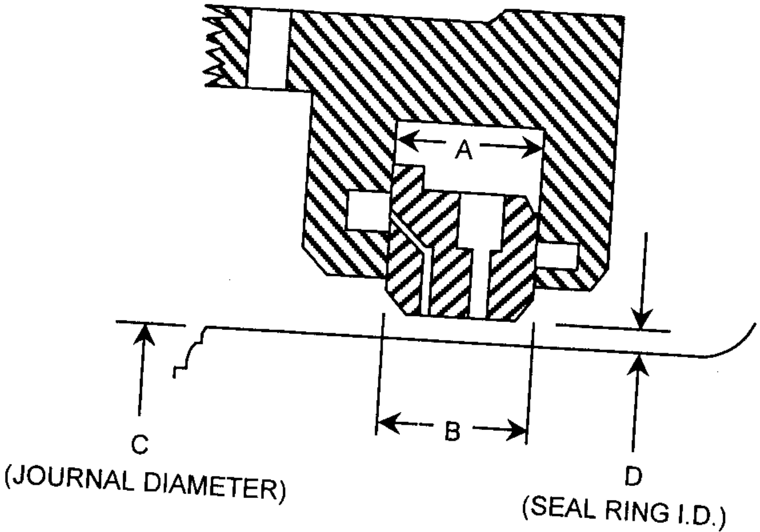
As Assembled ____X______ Reviewed By (W) Eng.: ______________________ Date: __________

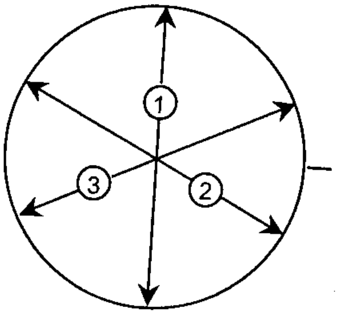
SIEMENS
WESTINGHOUSE

Spare rotor # S/N 79P030

H2 seal ring EE

CUSTOMER:	AEP
LOCATION/UNIT #:	MITCHELL 1
GENERATOR HYDROGEN SEAL CLEARANCES	
BB/FRAME:	JOB NO.:
COMPONENT/S.O.: GENERATOR	DWG.:





AXIAL CLEARANCES

LOCATION	DIM A = GROOVE WIDTH	DIM B = RING THICKNESS	CLEARANCE
TOP	1.912	1.901	0.011
BOTTOM	1.911	1.901	0.01
RIGHT SIDE	1.911	1.901	0.01
LEFT SIDE	1.911	1.901	0.01

Design clearance: .0071/2 - .009

RADIAL CLEARANCES

LOCATION	DIM C = JOURNAL	DIM D = RING I.D.	CLEARANCE
1	20.868	20.878	0.010
2	20.868	20.879	0.011
3	20.868	20.879	0.011

Design clearance: .009-.011 on diameter

Comments
Spare ring installed on 11/25/01, Ring has babbitted face on air side face,

FLATNESS CHECK	
READINGS > 0.00"	LOCATION (IB/OB SIDE, DEG. FROM A.R. PIN)
	.0015 will not go anywhere at 8 locations checked

Tool # Used ____________________

Cal. Due Date __________

As Found __________

Reading Taken By: _____Lackner / Riley__________ Date: _11/23/01____

As Assembled _____X_____

Reviewed By (W) Eng.: ____________________ Date: __________

SIEMENS
WESTINGHOUSE

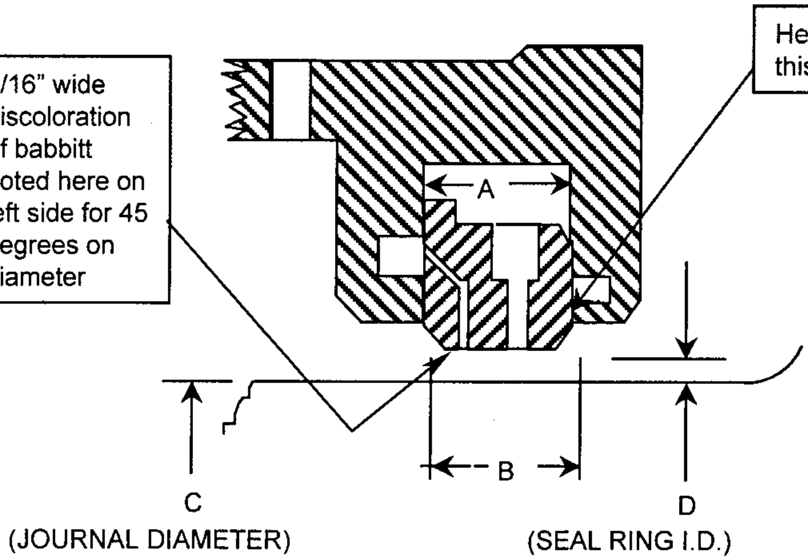
Spare rotor # S/N 79P030

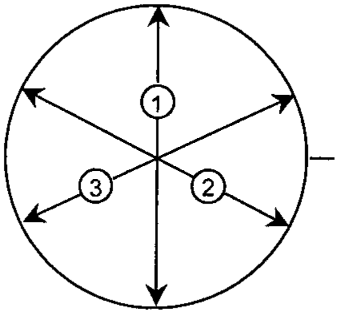
H2 seal ring EE

CUSTOMER:	AEP		
LOCATION/UNIT #:	MITCHELL 1		
GENERATOR HYDROGEN SEAL CLEARANCES			
BB/FRAME:		JOB NO.:	
COMPONENT/S.O.:	GENERATOR	DWG.:	

1/16" wide discoloration of babbitt noted here on left side for 45 degrees on diameter

Heavy scoring noted on L/H on face of this surface of seal ring.





AXIAL CLEARANCES			
LOCATION	DIM A = GROOVE WIDTH	DIM B = RING THICKNESS	CLEARANCE
TOP	1.911	1.903	0.008
BOTTOM	1.911	1.903	0.008
RIGHT SIDE	1.911	1.903	0.008
LEFT SIDE	1.911	1.903	0.008

Design clearance: .0071/2 - .009

RADIAL CLEARANCES			
LOCATION	DIM C = JOURNAL	DIM D = RING I.D.	CLEARANCE
1	20.868	20.882	0.014
2	20.868	20.872	0.004
3	20.868	20.871	0.003

Design clearance: .009-.011" on diameter

Comments
* One of the dowel pin holes is cracked. When the dowel is installed, the
area near the pin has a thickness of 1.907"
* A minor rub was noted by J. Cable as seen by a 1/16" wide discoloration
on the left side TE of the seal ring.

FLATNESS CHECK	
READINGS > 0.00"	LOCATION (IB/OB SIDE, DEG. FROM A.R. PIN)
	.0015 will not go anywhere at 8 locations checked

FILE: GN001.PPT Rev. 02

Tool # Used ____________________ Cal. Due Date __________

As Found X Reading Taken By: Lackner / Riley Date: 11/23/01

As Assembled X Reviewed By (W) Eng.: ____________________ Date: __________

Mitchell Unit 1

Generator Addendum III

During start-up after repairing the hydrogen seals, there was a still lot of vibration at T-10 and T-11 bearings. The vibration levels were acceptable at 500 MW, but the vibration went up drastically at 550 MW. After a conference call, it was decided that the problem could be traced either to a sling check on T-11 bearing or else the oil seal rings at T-10 bearing.

It should be noted that no sling check was done during the outage for the exciter coupling. During a visit to the Siemens-Westinghouse shop, both Jim Cable (Turbine Engineering) and Jack Huggins (Mitchell Plant) were told that as long as the coupling alignment was done with the collector rotor still in the shipping skid, no sling check was required.

The seal oil system, generator gas system, generator electrical system, and the turning gear were all tagged out. A blank was installed in T-10 and T-11 bearing feed lines. The doghouse was removed, the coupling guard was removed, and the upper half T-10 oil deflector was unbolted and removed.

The upper half of T-11 bearing was disassembled, and the lower half of T-11 bearing was rolled out. A sling check was done on T-11 bearing. The original readings showed that the bearing had been preloaded 0.007" to the right side and there was 0.007" runout on T-11 journal with the bearing rolled out. After discussions with Jim Cable, the bearing preload was left in the alignment, and the bolts were retorqued to remove the runout. The final runout on the sling check was 0.002".

T-11 bearing was rolled back in and the bearing was squared to the shaft. The upper half of T-11 bearing was reassembled.

During the disassembly of T-10 outer oil deflector, a rub was noted on the oil deflector teeth and on the shaft. Being unable to account for the rub, the decision was made to inspect the T-10 bearing. The upper half of the bearing was disassembled and removed. The oil seal rings were removed.

The oil seal rings were sent to Shuttlers for machining to open up the clearance. The seal rings were machined to have 0.020" clearance to the shaft. Unfortunately, the outboard seal ring was machined out of round. It was used as machined, see datasheet for seal ring sizes.

The lower half of T-10 bearing was rolled out. It was inspected visually and no problems were noted. The wear pattern was normal and indicated no tilt or twist in the bearing. The bearing clearance was checked to the mandrel and T-10 bearing had the design clearance of 0.042". The bearing saddle pads were meggered and were in great shape. The lower half bearing was reinstalled and resquared to the shaft.

The seal rings were reinstalled. The bolt on oil deflector was installed, but the teeth of the deflector had to be scraped to obtain a concentric alignment to the journal. The outer oil seal was reinstalled and aligned to the shaft. When the coupling guard was reinstalled, it pushed the oil deflector teeth into the shaft. The oil deflector was then reset with 0.007" clearance on the bottom.

An air test was done for about ½ of an hour with enough time to snoop the components that had been removed. No leaks were noted. The doghouse was reinstalled and the turbine was maintenance released at this time.

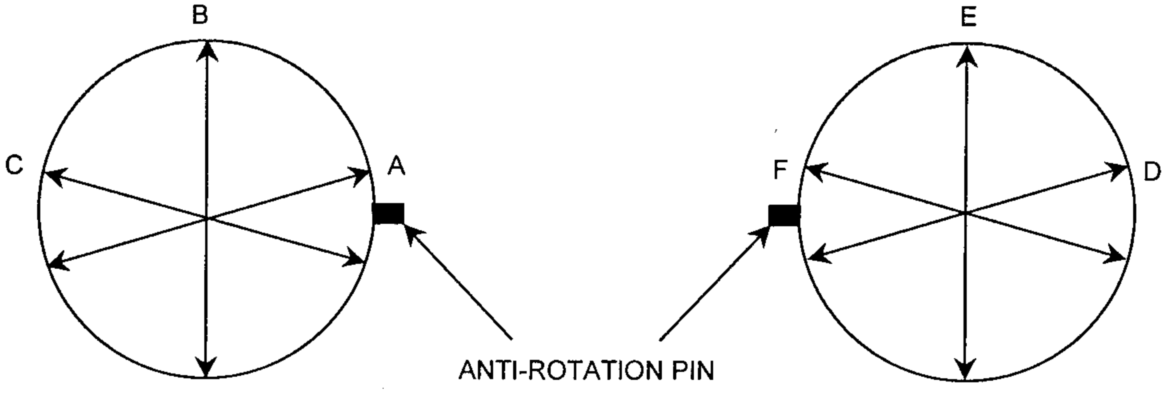
SIEMENS
WESTINGHOUSE

CUSTOMER: AEP
LOCATION/UNIT #: MITCHELL 1

GENERATOR BEARING SEAL RING

BB/FRAME: JOB NO.:
COMPONENT/S.O.: GENERATOR DWG.:

Spare rotor # S/N 79P030



BEARING NUMBER 10					
TURBINE SIDE		EXCITER END		CALCULATIONS	
POSITION	DIM.	POSITION	DIM.	AVG SHAFT O.D.	CLEARANCE
A	20.899	D		20.868	0.031
B	20.888	E		20.868	0.020
C	20.902	F		20.868	0.034

BEARING NUMBER 10					
TURBINE SIDE		EXCITER END		CALCULATIONS	
POSITION	DIM.	POSITION	DIM.	AVG SHAFT O.D.	CLEARANCE
A		D	20.894	20.868	0.026
B		E	20.890	20.868	0.022
C		F	20.894	20.868	0.026

Note: Design clearance is 0.012" to 0.014" on the diameter.

NOTE: Readings taken after the bearing seal rings were opened up by Shuttlers.

As Found ____________

Reading Taken By: ______K. Riley___________

Date: __12/04/01___

Final Assembly ____X______

Reviewed By (W) Eng.: ______________________________

Date: __________

Generator Auxiliaries

Hydrogen Coolers

The water system was tagged out. The upper and heads for the hydrogen coolers were disassembled and removed to access the tube sheets. It was noted that the upper heads had no metal diaphragm when disassembled.

The cooler heads were sent out for cleaning and were coated to be more erosion resistant. The cooler tubes were all washed out in place using high pressure water. Gap was subcontracted to do this work.

The cooler heads were then reinstalled with new gaskets and a new diaphragm. All bolting was torqued up to specs. A vent valve at both of the upper cooler heads had to be hard piped because the valves were plugged.

The lower water lines were reassembled. Some of the water vent lines were cracked. These lines were copper and were rebrazed at the points of the cracks and certain sections of tubing were replaced. The hydrogen coolers were water tested with no leaks noted.

Stator Water System

The stator water cooler heads were removed. The tubes were all cleaned using high pressure water by GAP. The cooler heads were sent out for cleaning and coating. The cooler heads were installed with new O-rings.

During the unit start-up, high conductivity was noted in the stator cooling water. This is indicative of a hydrogen leak into the water system. The unit was brought off line, the water system was pressurized, and the water leak was located. The leak was in a vent line internal to the generator frame. It was weld repaired. See "Generator Addendum I" for more details on the stator water leak.

Since this is not the first time that the vent line has caused a stator water leak, it is recommended that the vent line be replaced during the next outage on the generator.

Seal Oil System

The seal oil cooler heads were removed. The tubes were all cleaned using high pressure water by GAP. The cooler heads were sent out for cleaning and coating. The cooler heads were installed with new O-rings.

The seal oil filters were changed during the outage.

The seal oil system had to have a large amount of piping removed during the outage. All of the seal oil piping to the oil exciter had to be removed due to the static exciter installation. Three caps were installed over end of piping that could not be removed. Unfortunately, one cap was missed. During a start-up, a seal oil feed valve was opened and it had not been blanked on the other side. This valve is on the seal oil skid and is currently chained shut. There is a flange just downstream of the valve that would allow a blank to be installed easily. This flange should be blanked as soon as possible.

A seal oil flush was done independent of the lube oil flush. Hoses were used to bypass the hydrogen seals and went from the feed lines to the drain port in the end bell.

Hydrogen Gas System

The hydrogen gas filling system was also modified during the outage. This was to remove the lines that were used for the old exciter assembly. The fill line and vent line for the old exciter were removed, as were two sensing lines. The lines were capped off at the ends. No leaks were noted during the generator air test.

All other components of the hydrogen system were left as found.

Collector / Exciter

The old exciter was a hydrogen cooled brushless exciter. The exciter tunnel and hydrogen seals were disassembled, the exciter was uncoupled, all electrical connections and links were removed, all hydrogen and oil piping flanges were broke, and the exciter was removed. The exciter was shipped from Mitchell Plant to Kammer Plant for temporary storage.

All of the hydrogen fill and vent piping to the exciter was removed from the exciter to the hydrogen filling station. Piping was capped where necessary.

All of the seal oil piping, including the oil feed to T-11 bearing, was removed. This included all piping from the exciter to the exciter detraining tank down to the seal oil skid. Two pieces of pipe between the generator and exciter could not be removed because they were run through a tunnel in the foundation, but were disassembled at flanges on both sides of each line.

Steel plates were welded on the exciter base plate in four areas. The hydrogen piping access hole through the left side of the exciter base plate was covered, four of the conduit lines through the right side of the exciter base plate were covered (and grouted), and the main lead access hole was partially covered on both sides. This was done in accordance to Westinghouse drawing 2325J54.

The flatness of the base plate was checked by CMS machinists. A large mill was brought on site and the entire base plate was machined flat. The current taper from the CE to the GE was matched during the machining. The CMS machinists drilled four 2 ¾" holes through the base plate for foundation bolts, which were installed by a subcontractor, and drilled and tapped 17 other smaller holes in the base plate, all per Westinghouse drawing 2325J54.

The collector assembly is skid mounted with only one bearing. The turbine side was supported by the coupling in a shipping bracket. Per discussions between Jim Cable of turbine engineering, Jack Huggins of Mitchell plant, and Westinghouse personnel at their Charlotte service center, the coupling was to be aligned while in the shipping bracket and then no sling check was necessary.

The collector assembly and all hardware was received towards the second month of the outage. New coupling bolts, radial leads, wedges, oil seals, aligning keys, electrical links, and all foundation bolts were part of the package. A new T-10 oil deflector and a new coupling guard were provided. A new doghouse and all cooling air ducting were also part of the package. A cover for the new electrical links was manufactured by Shuttlers.

The coupling rabbet fits were inspected for proper interference fit. The elevation of the collector shaft to the skid was taken with the shipping brackets installed. All of the protective coatings and coverings were cleaned off of the collector assembly.

The collector assembly was set in place without removing the shipping brackets. The desired axial position was calculated and the coupling was gapped to match this position. A sixteen point alignment check was done by rolling the generator shaft only. The exciter base was moved to align the coupling.

After the coupling was aligned, the shipping bracket was removed. The coupling was then pulled together, but one of the new bolts was galled during the assembly. The bad bolt hole was cleaned up, but the galled bolt was unusable. One of the old coupling bolts rabbet fit was cleaned up and used as a replacement. The coupling bolts were torqued to OEM specs.

The elevation of the collector rotor was confirmed after the coupling was aligned. The radial leads were then fitted to the terminal studs in the coupling. CMS had to manufacture two copper spacers to fit between the radial leads and contact nuts on the generator half of the coupling. The insulation around the radial leads was fit and the radial lead wedges were installed and set. All work was done in accordance to Westinghouse drawing 2326J73.

New oil inlet piping to T-11 bearing and a new drain line were installed. The inlet piping was tapped into the T-10 bearing feed line, and the drain line was installed to a flange connected to the T-10 bearing overflow drain line. All piping was cleaned out with solvent and then oil prior to being bolted in place.

The new T-10 oil deflector was installed and was set to the dimensions shown on Westinghouse drawing 2326J73-2. The new coupling guard was installed and shimmed to provide for a concentric clearance to the T-10 oil deflector.

The new guard over the electrical links was installed, and then the new doghouse was installed. The new cooling air inlet ducts were installed on top of the doghouse. All of the air seals were set to the dimensions shown on Westinghouse drawing 2326J73-2. Felt was used to seal the base of the doghouse.

The brush rigging clearances were set by ICT personnel and all brushes were installed.

All electrical connections were made up by Mitchell plant ICT personnel. The new voltage regulator and transformer were installed under the direction of Bill Tisher of Mitchell Plant.

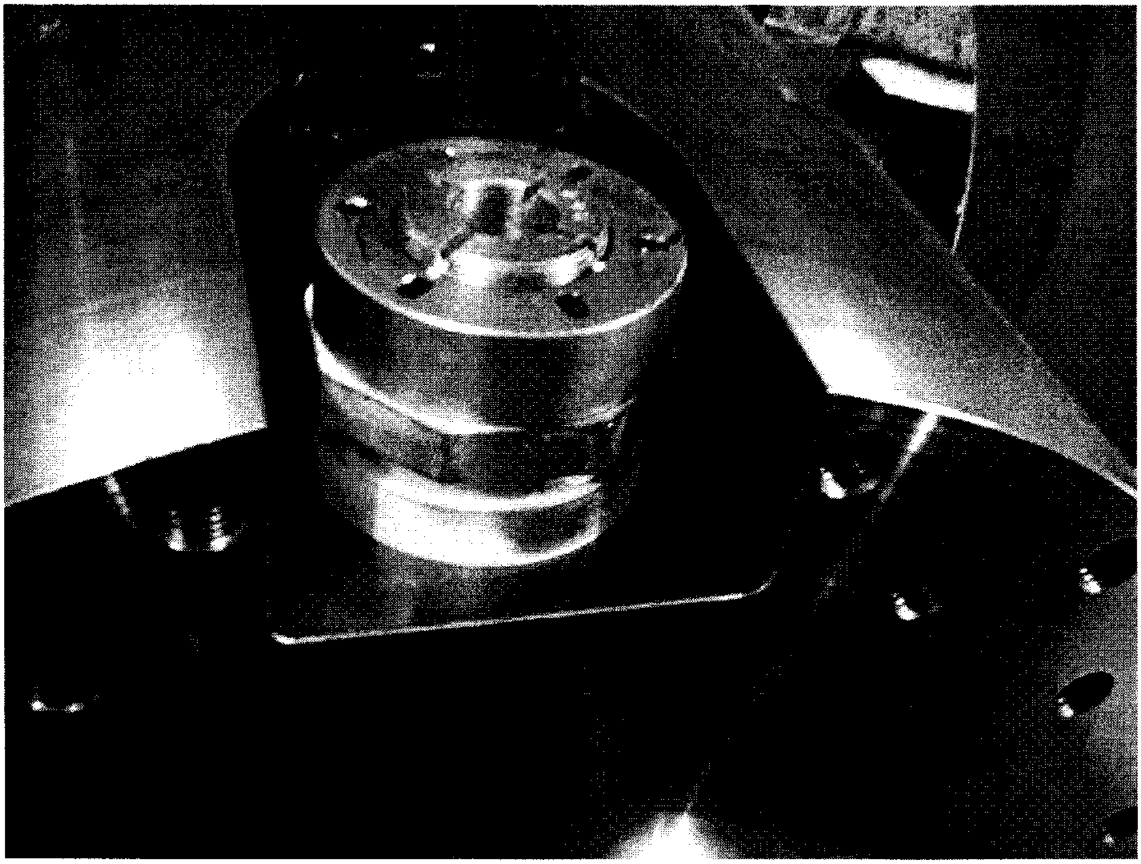
The piping to the T-11 bearing was bypassed from feed to drain during the oil flush to protect the bearing. All piping was restored prior to maintenance release.

During start-up, the vibrations at T-11 bearing were very high and numerous balance shots were installed in the coupling and fan ring. The T-11 bearing was visually inspected during one of the start-up balance runs (see Generator addendum II) and a sling check was done on the collector during another one of the balance runs (see Generator addendum III). All of the brushes were changed out due to being oil soaked during the hydrogen seal inspection between start-ups.

The Siemens-Westinghouse equipment description of the collector assembly is included in this section, along with a copy of the installation drawings provided by Westinghouse.

Mitchell Unit 1 – Generator

Fall 2001 Outage

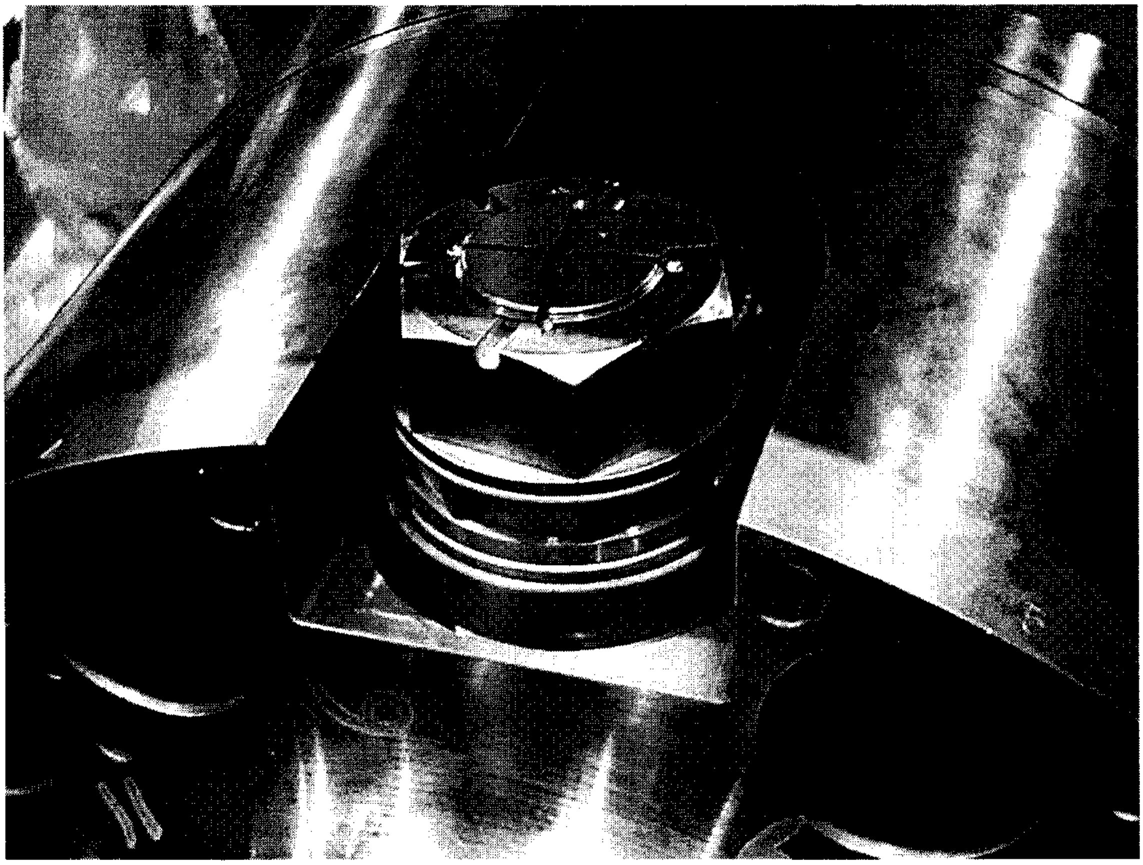


Comments:

This photo shows the radial lead for the generator / collector assembly as assembled new. This is the collector side of the coupling.

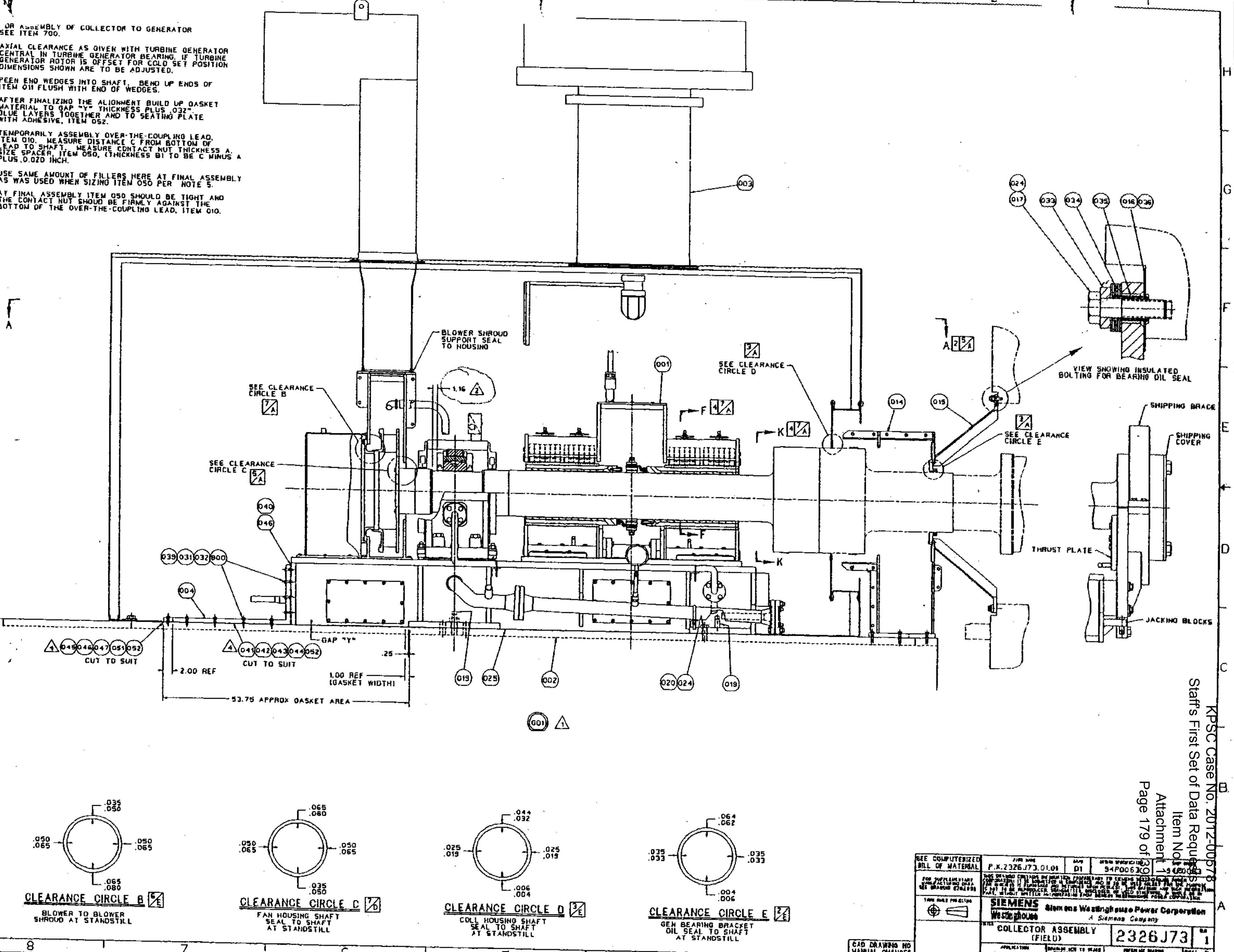
Mitchell Unit 1 – Generator

Fall 2001 Outage



Comments:

This photo shows the radial lead for the generator / collector assembly as assembled new.



1. OR ASSEMBLY OF COLLECTOR TO GENERATOR SEE ITEM 700.
2. AXIAL CLEARANCE AS GIVEN WITH TURBINE GENERATOR CENTRAL IN TURBINE GENERATOR BEARING. IF TURBINE GENERATOR ROTOR IS OFFSET FOR COLD SET POSITION DIMENSIONS SHOWN ARE TO BE ADJUSTED.
3. PEEN END WEDGES INTO SHAFT. BEND UP ENDS OF ITEM 011 FLUSH WITH END OF WEDGES.
4. AFTER FINALIZING THE ALIGNMENT BUILD UP GASKET MATERIAL TO GAP "Y" THICKNESS PLUS .032". GLUE LAYERS TOGETHER AND TO SEATING PLATE WITH ADHESIVE, ITEM 052.
5. TEMPORARILY ASSEMBLY OVER-THE-COUPLING LEAD, ITEM 010. MEASURE DISTANCE C FROM BOTTOM OF LEAD TO SHAFT. MEASURE CONTACT NUT THICKNESS A. SIZE SPACER, ITEM 050, (THICKNESS B) TO BE C MINUS A PLUS 0.020 INCH.
6. USE SAME AMOUNT OF FILLERS HERE AT FINAL ASSEMBLY AS WAS USED WHEN SIZING ITEM 050 PER NOTE 5.
7. AT FINAL ASSEMBLY ITEM 050 SHOULD BE TIGHT AND THE CONTACT NUT SHOUD BE FIRMLY AGAINST THE BOTTOM OF THE OVER-THE-COUPLING LEAD, ITEM 010.

CAD DRAWING NO MANUAL CHANGES

SEE COMPUTERIZED BILL OF MATERIAL

P.K.2326J73.01.01

01

94P0063

SIEMENS
Westinghouse
Siemens Westinghouse Power Corporation
A Siemens Company

COLLECTOR ASSEMBLY
(FIELD)

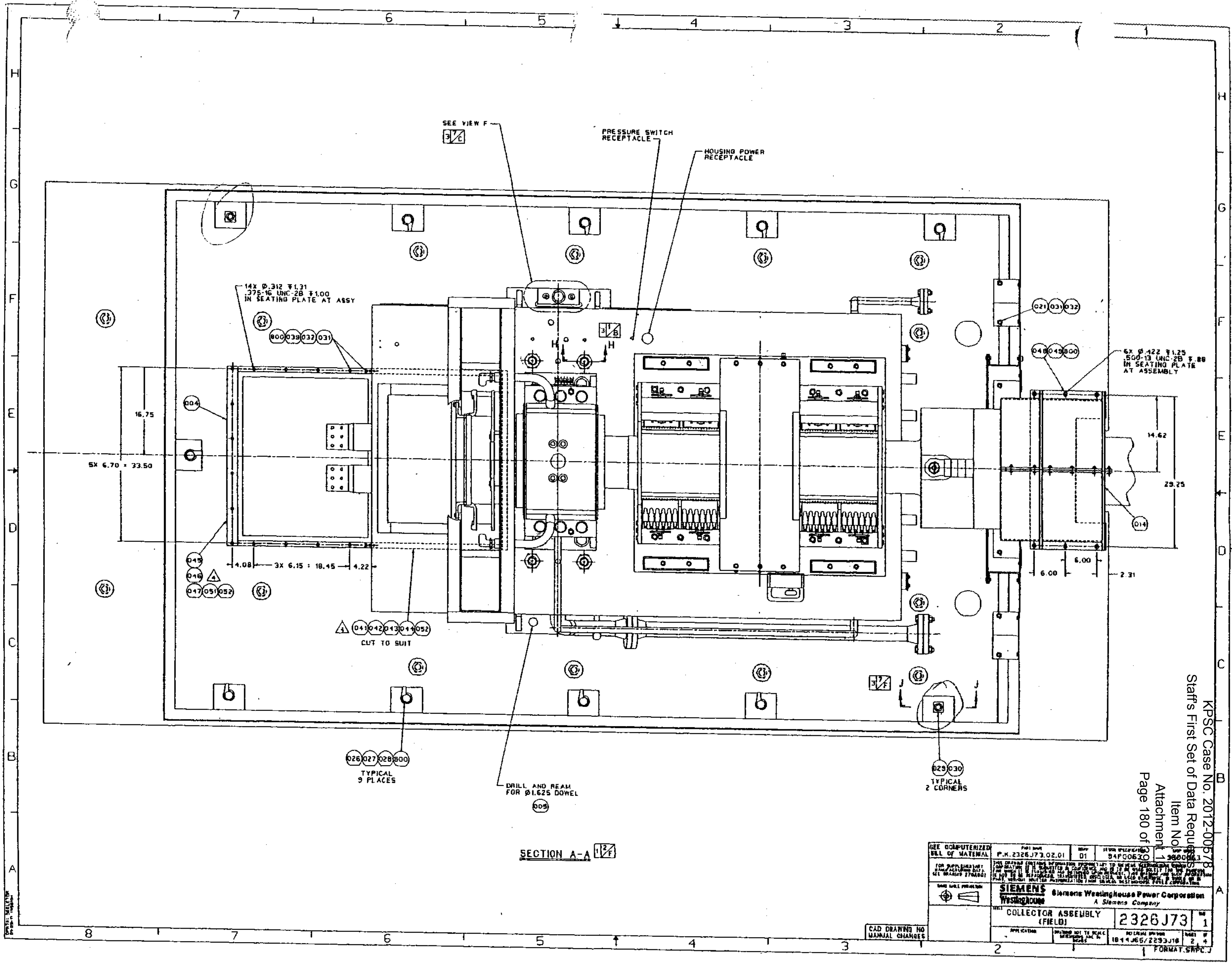
2326J73

1

1844J66/2293J18

1 4

FORMAT.SWPC.J



SEE COMPUTERIZED BILL OF MATERIAL

P.K.2326J73.02.01

01

94P0063

9600

SIEMENS Westinghouse

Siemens Westinghouse Power Corporation
A Siemens Company

COLLECTOR ASSEMBLY (FIELD)

2326J73

1

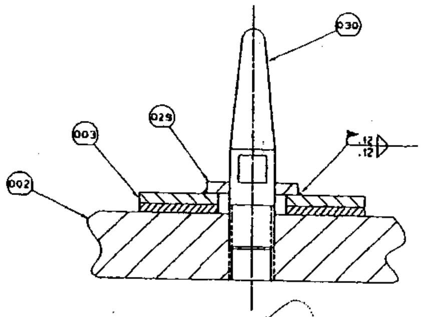
APPLICATION

1844J65/2293J18

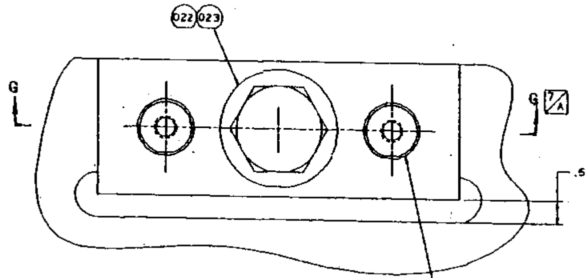
2 4

CAD DRAWING NO MANUAL CHANGES

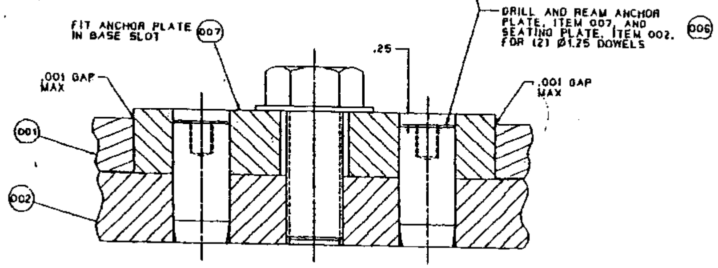
FORMAT.SWPC.J



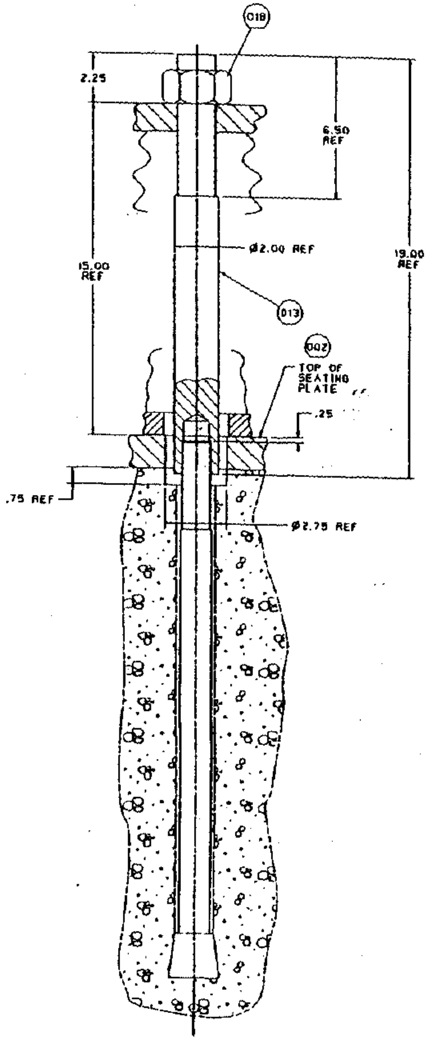
SECTION J-J 2 3/C
ENLARGED
TYPICAL 2 PLACES
SHOWING ASSEMBLY OF
DOWEL WASHERS, ITEM 029
USE ALIGNMENT DOWELS, ITEM 030,
FOR ANY SUBSEQUENT ALIGNMENTS
OF HOUSING TO SEATING PLATE



VIEW F 2 5/G



SECTION G-G 6/D
SHOWING ASSEMBLY
OF ANCHOR PLATE
TO SEATING PLATE



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TYPICAL 4 PLACES

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Westinghouse
Siemens Westinghouse Power Corporation
A Siemens Company

COLLECTOR ASSEMBLY
(FIELD)

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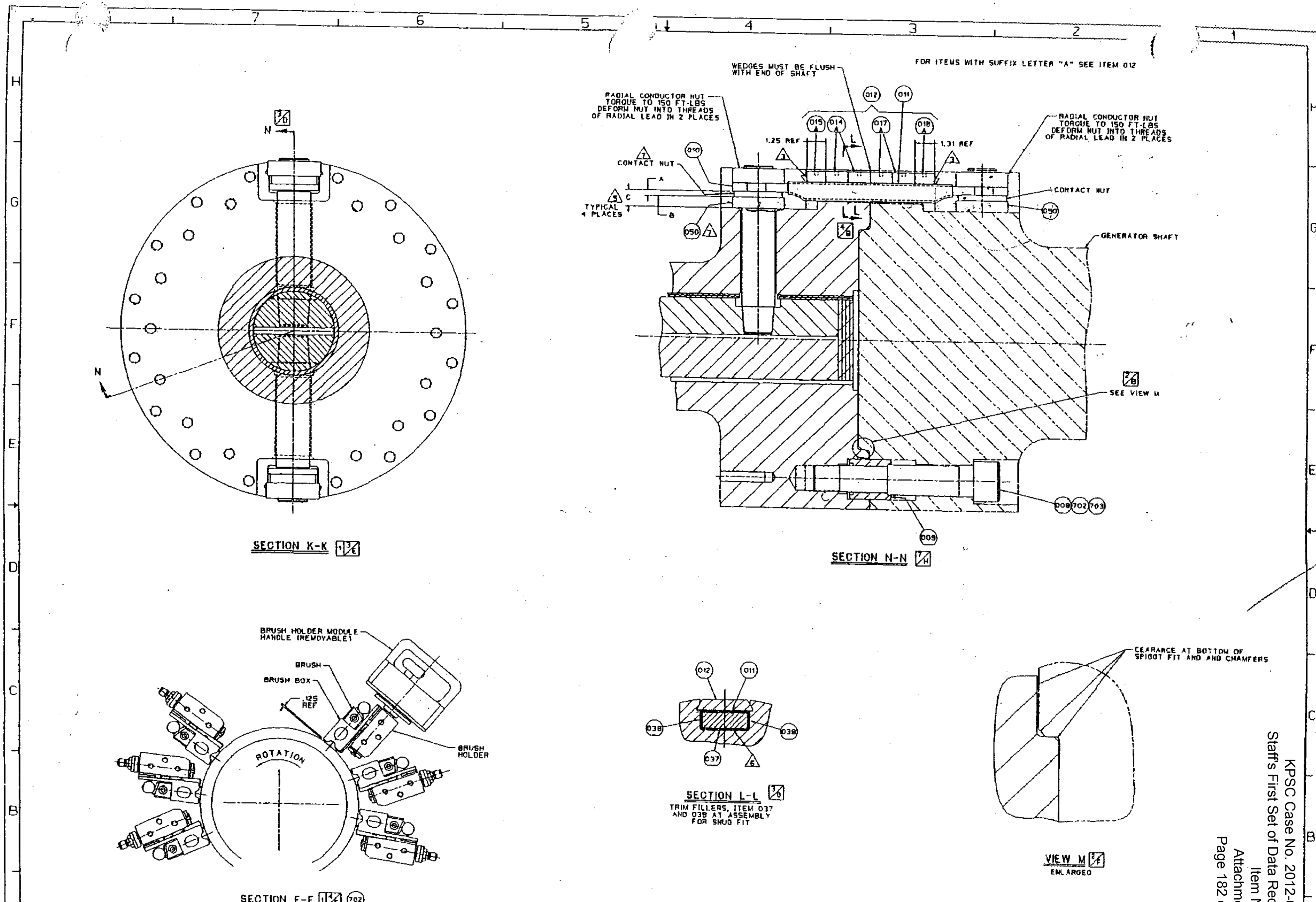

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SIEMENS
Westinghouse
Siemens Westinghouse Power Corporation
A Siemens Company

COLLECTOR ASSEMBLY
(FIELD)

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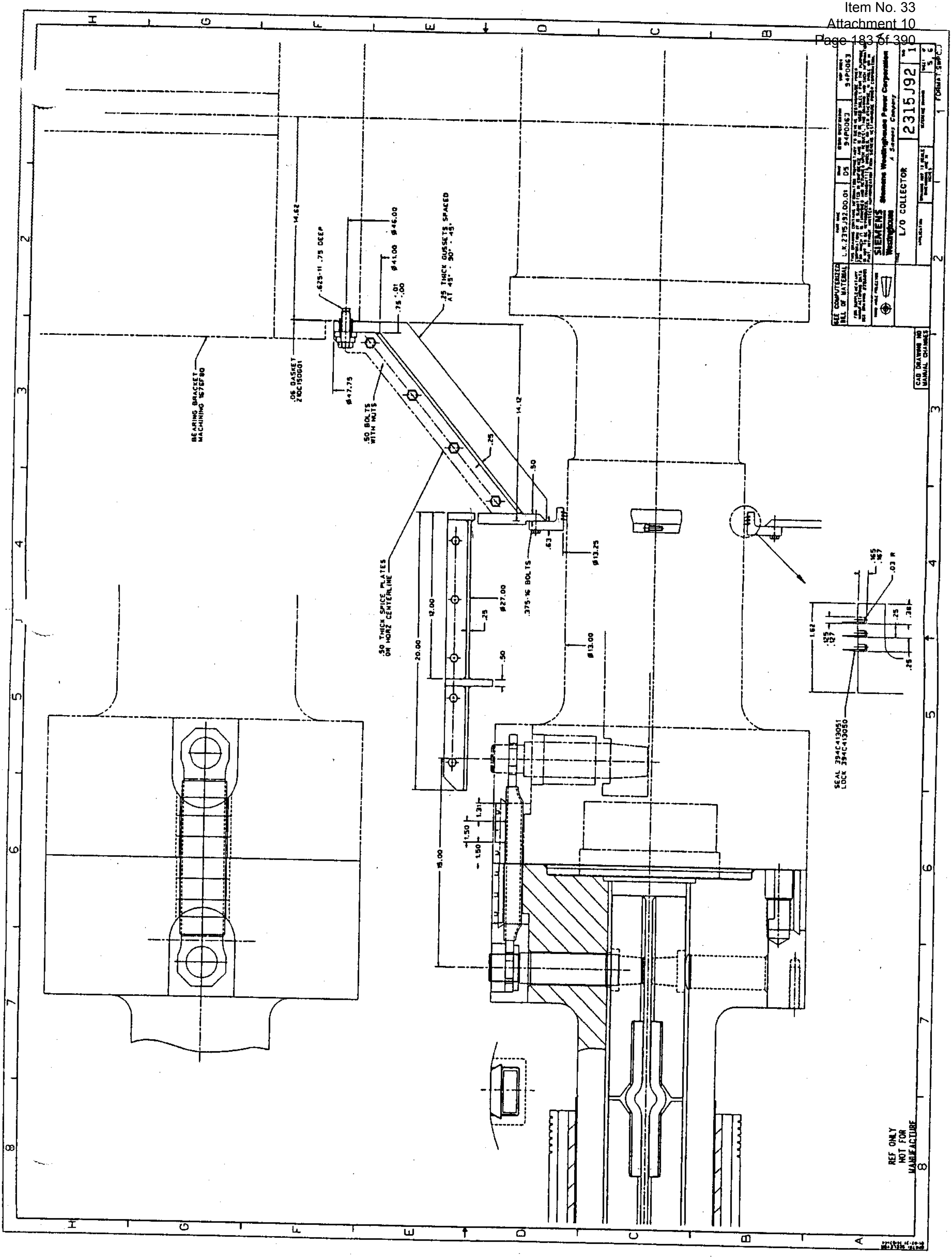
BEARING BRACKET MACHINING 1676F80
.06 GASKET 210C150G01
14.62
.625-11 .75 DEEP
.75 .01 .00
Ø41.00
Ø46.00
.25 THICK GUSSETS SPACED AT 45° · 90° · 45°
Ø47.75
.50 BOLTS WITH NUTS
.25
14.12
.50
.63
.375-16 BOLTS
Ø13.25
.50 THICK SPICE PLATES ON HORZ CENTERLINE
20.00
12.00
.25
Ø27.00
.50
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15.00
1.50
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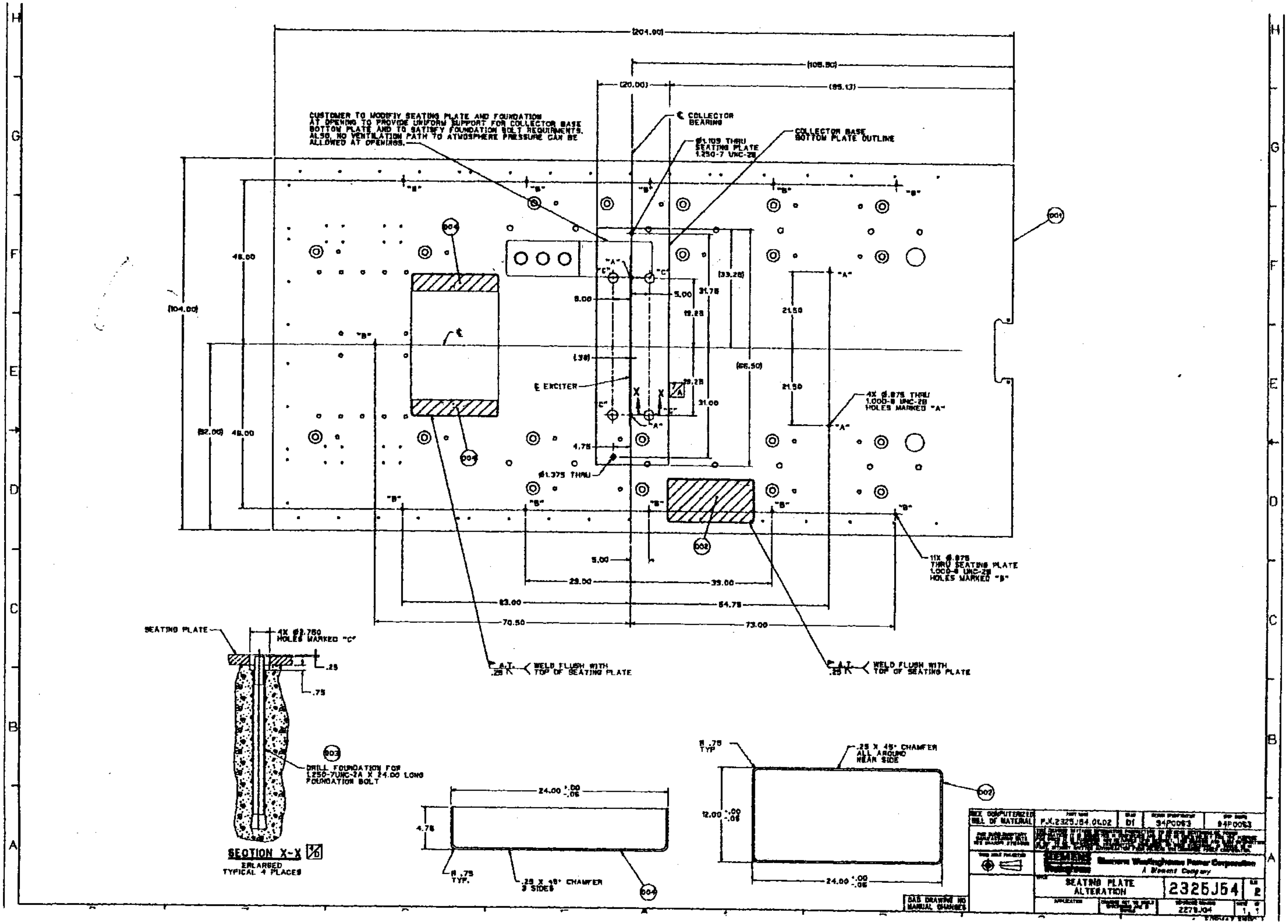
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CUSTOMER TO MODIFIY SEATING PLATE AND FOUNDATION AT OPENING TO PROVIDE UNIFORM SUPPORT FOR COLLECTOR BASE BOTTOM PLATE AND TO SATISFY FOUNDATION BOLT REQUIREMENTS. ALSO, NO VENTILATION PATH TO ATMOSPHERE PRESSURE CAN BE ALLOWED AT OPENINGS.
℄ COLLECTOR BEARING
ø1.109 THRU SEATING PLATE 1.250-7 UNC-2B
COLLECTOR BASE BOTTOM PLATE OUTLINE
"B"
"A"
"C"
001
002
003
004
48.00
(104.00)
(82.00)
8.00
5.00
31.75
(33.28)
19.28
21.50
(66.50)
(.38)
℄
℄ EXCITER
X
29.28
31.00
4X ø.875 THRU 1.000-8 UNC-2B HOLES MARKED "A"
4.75
ø1.375 THRU
11X ø.875 THRU SEATING PLATE 1.000-8 UNC-2B HOLES MARKED "B"
29.00
39.00
63.00
64.75
70.50
73.00
A.T. .25 WELD FLUSH WITH TOP OF SEATING PLATE
SEATING PLATE
4X ø2.750 HOLES MARKED "C"
.25
.75
DRILL FOUNDATION FOR 1.250-7UNC-2A X 24.00 LONG FOUNDATION BOLT
SECTION X-X 1/6
ENLARGED TYPICAL 4 PLACES
24.00 +.00 -.06
4.75
R .75 TYP.
.25 X 45° CHAMFER 3 SIDES
R .75 TYP
.25 X 45° CHAMFER ALL AROUND NEAR SIDE
12.00 +.00 -.06
SEE COMPUTERIZED BILL OF MATERIAL
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Siemens Westinghouse Power Corporation
A Siemens Company
SEATING PLATE ALTERATION
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INSTALLATION OF COLLECTOR ASSEMBLY UN THE FOUNDATION AND ASSEMBLY TO THE GENERATOR

USE THE FOLLOWING PROCEDURES AS A GUIDE TO SET THE COLLECTOR ASSEMBLY ON THE FOUNDATION AND ALIGN AND ASSEMBLE IT TO THE GENERATOR.

NOTE.

THIS DRAWING IS APPLICABLE TO NEW COLLECTORS BEING INSTALLED ON NEW FOUNDATIONS AND SEATING PLATES, AS WELL AS NEW OR SERVICE COLLECTORS BEING INSTALLED ON EXISTING SEATING PLATES.

THE COLLECTOR PACKAGE CANNOT BE INSTALLED UNTIL THE GENERATOR HAS BEEN POSITIONED ON THE FOUNDATION. THE CLEARANCES BETWEEN THE ROTATING AND STATIONARY PARTS SHOULD BE SET AS CALLED FOR ON THE COLLECTOR ASSEMBLY (FIELD) DRAWING. PARTICULAR CARE SHOULD BE EXERCISED TO GUARANTEE THAT VARIOUS GASKETED JOINTS PROVIDE A GOOD SEAL WITH THEIR MATING PARTS AND THAT PROPER BRUSH HOLDER CLEARANCES EXIST.

I. PRE-ASSEMBLY OPERATIONS AND CHECKS (PRIOR TO SETTING ON FOUNDATION).

A. PRIOR TO ERECTION, COLLECTOR BASE, SEATING PLATE, ANCHOR PLATE (IF APPLICABLE) AND DOWELS MUST BE WASHED WITH A SOLVENT. ANY RUST IS TO BE REMOVED.

B. BEFORE THE COLLECTOR CAN BE ASSEMBLED TO THE GENERATOR, THE FOUNDATION MUST BE PREPARED PER P.S. 87[illegible], AND THE JACKING PLATES MUST BE ASSEMBLED ON THE COLLECTOR FOUNDATION AS SPECIFIED IN THE TURBINE GENERATOR OUTLINE DRAWING AND METHOD OF MOUNTING GENERATOR ON FOUNDATION DRAWING.

C. CHECK AND RECORD THE RUNOUT OF THE COLLECTOR FACE AND SPIGOT FIT ON THE GENERATOR SHAFT BEFORE BEGINNING ASSEMBLY OF THE COLLECTOR. IF THE RUNOUT ON EITHER SURFACES EXCEEDS .0005 INCH TIR THE SURFACES MUST BE CORRECTED TO .0005 INCH BEFORE PROCEEDING TO ASSURE ACCEPTABLE VIBRATION LEVELS AND LONG BRUSH LIFE.

D. REMOVE THE SHIPPING COVER OVER THE COLLECTOR COUPLING FACE, AND THE BOLTS HOLDING THE COLLECTOR ROTOR TO THE SHIPPING BRACE.

E. CLEAN THE COUPLING FACE, O.D., COUPLING BOLT HOLES AND AXIAL LEAD CONNECTION BOLT HOLES (IF APPLICABLE) OF THE COLLECTOR AND GENERATOR TO REMOVE SLUSHING COMPOUND, BURRS, OR OTHER DAMAGE.

F. CHECK TO MAKE SURE THAT THE MATING FACES OF THE COUPLING ARE FLAT WITHIN .0005 INCH.

G. CHECK THE PILOT FITS OF THE COLLECTOR AND GENERATOR ROTORS TO INSURE THAT THE AXIAL AND RADIAL CLEARANCES WILL PERMIT PROPER ASSEMBLY OF THE TWO COUPLING FACES. RADIAL CLEARANCES SHOULD ALWAYS BE POSITIVE AND ZERO TO A MAXIMUM OF .001 INCH RADIAL. THE MALE SPIGOT SHOULD NOT BOTTOM IN THE FEMALE SPIGOT, AND CHAMFERS MUST BE ADEQUATE TO AVOID INTERFERENCE WITH FILLETS.

H. CHECK THE FIT OF THE SHEAR SLEEVES IN THE SHEAR SLEEVE HOLES OF THE COLLECTOR AND GENERATOR COUPLINGS AS INDICATED ON THE COLLECTOR ASSEMBLY (FIELD) DRAWING. PRICK PUNCH O.D.'S OF SLEEVES AT (4) PLACES 90 DEGREES APART TO PREVENT AXIAL MOVEMENT DURING INDICATOR CHECKS. ASSEMBLE SHEAR SLEEVES INTO HOLES AT LOCATIONS SHOWN ON COLLECTOR ASSEMBLY (FIELD) DRAWING. IF NECESSARY, LIGHTLY TAP SHEAR SLEEVES TO PROPERLY SEAT IN THE HOLES.

I. ON THOSE DESIGNS REQUIRING SHEAR SLEEVE SPACERS TO BE ASSEMBLED IN THE COLLECTOR COUPLING HOLES, ASSEMBLE SPACERS INTO SHEAR SLEEVE HOLES PER COLLECTOR ASSEMBLY (FIELD) DRAWING.

J. THE COLLECTOR SHAFT WAS ALIGNED TO THE COLLECTOR ASSEMBLY IN THE FACTORY, AND SHOULD BE PARALLEL TO THE TOP OF THE COLLECTOR BASE WITHIN .004 INCH. WITH THE ASSEMBLY SETTING ON A FLAT SURFACE, VERIFY THE HEIGHT OF THE SHAFT CENTERLINE ABOVE THE BASE AT THE INBOARD AND OUTBOARD ENDS OF THE COLLECTOR SHAFT. IF ADJUSTMENT IS NECESSARY, CORRECT AT SHIPPING BRACE END USING JACKING BLOCKS OR SHIMS UNDER THE SHIPPING BRACE. IF SHAFT HEIGHT IS ADJUSTED, SEAL CLEARANCES AND PEDESTAL SQUARE (IF APPLICABLE) MUST BE REVERIFIED.

II. PRE-GROUTING OPERATIONS (AFTER SETTING ON FOUNDATION).

A. THE COLLECTOR ASSEMBLY AND SEATING PLATE SHOULD NOW BE PLACED ON THE FOUNDATION AND ALIGNED TO APPROXIMATE ELEVATION, SET LEVEL TRANSVERSELY, AND INCLINED AXIALLY AS PER ELEVATION AND COUPLING ALIGNMENT DATA DRAWING, WHILE MAINTAINING FLATNESS OF THE SEATING PLATE THROUGHOUT ITS LENGTH BY PROPER ADJUSTMENT OF THE JACKING SCREWS. ON THOSE UNITS WITH A BEARING, INSTALL ANCHOR PLATE AND DOWELS AT BEARING PEDESTAL BASE LOCATION PER COLLECTOR ASSEMBLY (FIELD) DRAWING, AND ASSEMBLE AND TIGHTEN THE BASE TO SEATING PLATE HOLD DOWN BOLTS.

B. THE COLLECTOR IS SHIPPED WITH THE INBOARD END OF THE SHAFT SUPPORTED IN A SHIPPING BRACE AND WITH THE SHAFT SHIFTED TOWARD THE OUTBOARD END OF THE COLLECTOR (AWAY FROM THE TURBINE) .875 INCHES. ON COLLECTORS WITHOUT AN OUTBOARD END BEARING, A SECOND SHIPPING BRACE SUPPORTS THE OUTBOARD END OF THE SHAFT.

WITH THE GENERATOR IN ITS C.G. POSITION (ROTOR CENTRAL IN THE BEARINGS) AND THE COLLECTOR SHIFTED OUTBOARD AGAINST THE SHIPPING BRACE, MEASURE THE ACTUAL CLEARANCE BETWEEN THE SHOULDER OF THE SHAFT JOURNAL AND THE OUTBOARD END OF THE BEARING IF APPLICABLE. THE DIFFERENCE BETWEEN THIS READING AND THE DIMENSION SHOWN ON THE COLLECTOR ASSEMBLY (FIELD) DRAWING DETERMINES THE THICKNESS OF THE GAUGE BLOCK TO BE USED WHEN PARALLELING THE COUPLING FACES, SO THAT WHEN THE COLLECTOR IS COUPLED TO THE GENERATOR (WITH THE GENERATOR ROTOR IN ITS C.G. POSITION) THE AXIAL CLEARANCES BETWEEN THE BEARING AND SHOULDER ON THE SHAFT WILL BE MAINTAINED PER DIMENSION OF THE COLLECTOR ASSEMBLY (FIELD) DRAWING.

NOTE: CALCULATED GAUGE BLOCK SHOULD BE GREATER THAN SPIGOT FIT DEPTH. IF NOT, DETERMINE REASON FOR ROTOR MISLOCATION BEFORE CONTINUING.

C. CENTER THE COLLECTOR COUPLING WITH RESPECT TO THE GENERATOR COUPLING AS FOLLOWS. MOUNT A DIAL INDICATOR ON THE O.D. OF THE GENERATOR COUPLING SUCH THAT IT READS THE CONCENTRICITY OF THE COLLECTOR COUPLING WITH RESPECT TO THE GENERATOR COLLECTOR COUPLING. CENTER THE COUPLINGS WITHIN .002 TIR AND ALIGN THE COUPLING FACES SO THAT THE COUPLING GAP IS EQUAL AROUND CIRCUMFERENCE (GAP ON VERTICAL AND HORIZONTAL CENTERLINES), AND EQUAL ON BOTH SIDES OF CENTERLINES. CHECK GAP BETWEEN COUPLING FACES WITH SHEAR SLEEVES DISENGAGED, (WHILE MAINTAINING CONCENTRICITY OF COUPLINGS), BY VERTICAL, AXIAL, AND LATERAL MOVEMENTS OF THE SEATING PLATE. CHECK AND RECORD ALL COLLECTOR ROTOR AXIAL AND RADIAL CLEARANCES SHOWN ON COLLECTOR ASSEMBLY (FIELD) DRAWING. TAKE INTO CONSIDERATION THAT THE ROTOR IS SHIFTED OUTBOARD AND THE ACTUAL AXIAL CLEARANCE WILL DIFFER FROM THE DRAWING CLEARANCE BY THE AMOUNT THE ROTOR IS SHIFTED OUTBOARD.

III. POST GROUTING ASSEMBLY.

A. REMOVE ALL JACKING BOLTS FROM THE SEATING PLATE AND PLACE IN STOREROOM.

B. TIGHTEN ALL FOUNDATION BOLTS AND INSTALL COVER PLATES OVER FOUNDATION BOLTS. REMOVE OIL PIPING COVERS WHERE APPLICABLE.

C. CHECK FINAL ALIGNMENT OF PRE-GROUTING ASSEMBLY. IF AN ADJUSTMENT TO THE PRE-GROUTING ALIGNMENT IS REQUIRED, SHIMS ARE PROVIDED BETWEEN THE COLLECTOR BASE AND SEATING PLATE.

D. REMOVE TOP HALF OF SHIPPING BRACE.

E. DISCONNECT BEARING METAL THERMOCOUPLE AND VIBROMETER PICKUPS (WHERE APPLICABLE).

F. REMOVE PEDESTAL CAP AND TOP HALF OF BEARING (WHERE APPLICABLE).

G. USING 2 SETS OF 2 COUPLING SCREWS (LOCATED 180 DEGREES APART) OR JACK SCREWS IN THE SHIPPING BRACE, PULL THE ROTOR AXIALLY TOWARD THE GENERATOR UNTIL THE SPIGOT FIT AND SHEAR SLEEVES ARE ENGAGED. CONTINUE TO PULL THE ROTOR AXIALLY, SIMULTANEOUSLY ADJUSTING THE COUPLING SCREWS SO THAT THE PRESSURE IS APPLIED EVENLY TO EACH SIDE OF THE COUPLING, UNTIL THE COLLECTOR COUPLING FACE MAKES CONTACT WITH THE FACE OF THE GENERATOR SHAFT.

H. LUBRICATE COUPLING STUD THREADS WITH A LIGHT COAT OF TURBINE OIL AND INSERT IN THE TOP HALF OF COUPLING ONLY. TORQUE STUDS, INCLUDING THE STUDS AT SHEAR SLEEVE LOCATIONS PER COLLECTOR ASSEMBLY (FIELD) DWG. ASSEMBLE NUTS TO STUDS.

I. REMOVE THE LOWER HALF OF THE SHIPPING BRACE.

J. LUBRICATE THE REMAINING COUPLING STUDS AND INSERT INTO COUPLING. TORQUE STUDS SAME AS STEP H. TORQUE ALL NUTS PER COLLECTOR ASSEMBLY (FIELD) DWG IN INCREMENTS OF 50 FT-LBS. TORQUE DIAMETRICALLY OPPOSITE NUTS IN SEQUENCE TO ASSURE COUPLING FACES REMAIN PARALLEL.

K. PERFORM SWING CHECK.

L. REASSEMBLE BEARING AND PEDESTAL CAP, AND SET LABYRINTH SEALS (IF APPLICABLE).

M. ASSEMBLE MAIN LEADS TO GENERATOR AS FOLLOWS:

ON UNITS WITH MAIN LEAD CONNECTION TO GENERATOR INTERNAL TO SHAFT:

M1. REMOVE PIPE PLUGS OR COVER PLATE ON THE BACKSIDE OF THE COLLECTOR COUPLING AND ASSEMBLE CONDUCTOR CONNECTION SCREWS. TORQUE PER COLLECTOR ASSEMBLY (FIELD) DWG IN 40 FT-LB INCREMENTS. ENSURE THAT NO FOREIGN MATERIAL IS IN CONNECTION SCREW HOLES PRIOR TO TORQUING. REPLACE PIPE PLUGS OR COVER PLATE.

ON UNITS WITH MAIN LEAD CONNECTION OVER THE COUPLING:

M2. REMOVE TEMPORARY SPACER AT COLLECTOR RADIAL LEADS AND ASSEMBLE FLEX LEADS. PACK LEAD SLOT AS SHOWN ON COLLECTOR ASSEMBLY (FIELD) DRAWING. ASSEMBLE LOCKPLATE, FILLER BLOCK AND WEDGES. BEND LOCKPLATE DOWN OVER FILLER BLOCK AND UP OVER WEDGES.

RE-ASSEMBLE NUT TO THE COLLECTOR RADIAL LEADS AND TORQUE PER COLLECTOR ASSEMBLY (FIELD) DWG WHILE HOLDING THE RADIAL LEAD. RE-ASSEMBLE THE GENERATOR RADIAL LEAD NUT ACCORDING TO INFORMATION IN THE GENERATOR INSTRUCTION BOOK.

O. MEGGER BETWEEN RADIAL LEAD AND GROUND AT 500 V D.C. COMBINED INSULATION RESISTANCE OF COLLECTOR AND GENERATOR WINDING SHOULD BE 10 MEGOHMS OR GREATER. LOW READINGS SHOULD BE INVESTIGATED PRIOR TO PROCEEDING.

P. RECORD DIAL INDICATOR READINGS ON GENERATOR AND COLLECTOR COUPLINGS, BEARING JOURNAL (IF APPLICABLE), AND COLLECTOR RINGS.

Q. CHECK ALL COLLECTOR AXIAL AND RADIAL CLEARANCES PER COLLECTOR ASSEMBLY (FIELD) DRAWING.

R. ASSEMBLE BRUSH HOLDER MODULES IN BRUSH RIGGING. VERIFY BRUSH HOLDER TO COLLECTOR RING CLEARANCES.

S. CHECK INSULATION RESISTANCE OF UNIT TO GROUND USING A 500 V MEGGER.

ON THOSE UNITS WITH BEARING:

T1. VERIFY PEDESTAL SQUARENESS WITH SHAFT.

T2. FLUSH THE OIL SYSTEM.

T3. REMOVE AND CLEAN TOP AND BOTTOM BEARING HALVES AND CLEAN BEARING PEDESTAL. REFER TO BEARING AND PEDESTAL CROSS SECTION INSTRUCTION BOOK FOR DETAILS.

T4. MEGGER PEDESTAL AND BEARING RING INSULATION.

T5. RE-ASSEMBLE BEARING THERMOCOUPLE(S), BEARING, AND PEDESTAL CAP.

T6. ASSEMBLE VIBROMETER PICKUPS.

U. ASSEMBLE COLLECTOR HOUSING OVER COLLECTOR AND BOLT TO SEATING PLATE.

V. MAKE ELECTRICAL CONNECTIONS BETWEEN HOUSING AND BASE.

W. VERIFY HOUSING SEAL TO BLOWER SHROUD SUPPORT ASSEMBLY.

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Westinghouse Electric Corporation
POWER GENERATION

COLLECTOR
INSTALLATION
AND REMOVAL

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COLLECTOR SET

INTRODUCTION

The generators described on the instruction book facing sheet obtain excitation from static exciters through collector sets with slip rings attached to the generator shaft. This instruction book describes the Siemens Westinghouse collector set, its operation, and its maintenance.

GENERAL DESCRIPTION

The collector set shown in Figure 1, Collector Assembly, consists of:

1. A bolt-on rotor consisting of insulated slip rings, electrical connections to the generator field winding, a bearing journal, and a fan for ventilation.
2. Brush rigging for both positive and negative polarities including removable brush holders.
3. An acoustic house incorporating open air cooling and constructed with doors, viewing windows, lights, a convenience outlet, filters in a top mounted filter house, and a top mounted discharge muffler. The house is constructed to avoid water ingestion.
4. A base which supports the brush rigging and the bearing pedestal and includes instrumentation, space heaters and prewired terminal boards for electrical connections.
5. A bearing and bearing pedestal which supports the outboard end of the shaft and provides dynamic stability.

The exciter is connected to the brushes on the brush rigging through leads in the base to supply the excitation power to the field winding of the generator.

COMPONENT DESCRIPTION

Collector Rings

The two piece collector ring assemblies are made of an alloy steel forged outer slip ring shrunk onto an inner bushing with cooling channels. The slip ring surface is spirally grooved.

These grooves serve three functions:

1. They interrupt the small arcing contacts which carry current between the collector rings and brushes, thus assuring even current distribution in the brush face.
2. Better contact between the ring and the brush is achieved by allowing the entrapped air to escape.
3. The grooves furnish additional surface for cooling.

The ring assembly has subsurface ventilating passages through which air is forced by the shaft mounted fan. Air also flows over the slip ring surface.

The collector rings and the generator field winding are connected together through a combination of radial leads, axial leads, and an internal connection at the coupling faces as shown in Figure 1, Collector Assembly. The axial leads are located in the bore of the collector shaft. Radial leads at one end of the axial leads connect to the slip rings. At the other end of the axial leads, flexible "butterfly" leads connect to similar leads in the generator rotor.

Brush Holder

The brush rigging uses brush magazines of 6-brush capacity as illustrated in Figure 4, Brush Holder Module. This style of brush holder allows safe and easy removal of six brushes at a time. Removal of the brush holders may be performed while the unit is on-line, permitting brush changing to be done at a remote location. A removable insulated handle (Figure 6) is used for removing and installing the brush magazines as shown in Figure 5. Spring tension adjustments are eliminated by using constant-force Negator™ springs.

Bearing and Bearing Pedestal

Light, self-supporting collector shafts, bolted to the end of the generator, do not require a separate bearing. However, increased weight or length, which lowers the resonance speed of the collector shaft overhang, must be dynamically stabilized with a collector bearing. Other considerations may also force the use of a bearing, such as driving through the collector set with a starting motor and flexible coupling. (Both increased weight for the increased shaft length and the length itself were criteria used in deciding that bearings were needed on these collectors.) See Figure 10, Bearing and Pedestal, for details.

The bearing pad support ring is insulated from the bearing pedestal with high-compressive strength Class F G-11 glass-epoxy laminate. Likewise, the pedestal is insulated from the base.

All piping and electrical connections attaching to the pedestal are also insulated. This arrangement gives two sets of insulation in series to provide a second level of protection against currents circulating through the bearing pads.

WARNING

Do not defeat the function of the bearing support ring and pedestal insulation. Circulating currents that will destroy the bearing pads and damage to the shaft can result from the homopolar voltage produced on the generator shaft. Always replace the insulation with like components.

The bearing is equipped with two locations to install shaft proximeters at plus and minus 45º from vertical to measure vibration in both the X and Y planes. A duplex bearing metal thermocouple and a duplex bearing oil drain thermocouple are provided. The type is listed on Figure 3, Collector Outline Supplement. Suggested operating limits and expected levels are given in the **OPERATION** section of this booklet.

Ventilation

The collector is cooled by room air drawn through filters and then over the brush rigging and collector rings. Through the arrangement and setting of seals at the discharge end of the rings, a portion of this air is forced into subsurface slots for direct cooling of the bushing-ring assembly. The heated air discharging from the rings passes through the base and into the fan. The fan discharges this air through the discharge chute.

By locating the fan at the discharge end of the ventilation path, the temperature rise of the cooling air caused by the fan itself does not contribute to the temperature rise of the collector rings and brush rigging.

Filters

Filters are installed in the air inlet to keep dust and foreign objects from entering the brush rigging and collector area. The filter system is designed for easy maintenance. A filter differential gauge and switch is set to provided for monitoring of the filter's condition. The pressure switch is set to provide an alarm when filters require maintenance. The differential pressure across the inlet should not exceed 2″ H_2O. The alarm setting should be slightly lower than 2″ H_2O, dependent on site conditions and maintenance availability. Either replaceable or washable filters can be used. Contact Siemens Westinghouse for ordering, or the OEM. Refer to the REPLACEMENT MATERIALS list located at the front of this Instruction Leaflet for filter information.

Instrumentation

Instrumentation provided for monitoring are cold and hot air RTDs (resistance temperature detectors), bearing metal thermocouples, bearing oil thermocouples, vibrometers, and a filter differential pressure gauge and switch. Figure 7, Collector Instrumentation Wiring, as well as Figure 3, Collector Outline Supplement, show the number and types of instruments, and other details.

After inspecting for completeness and freedom from damage, store the collector in a dry area free from contaminants. Use plastic drop cloths to protect any materials placed in staging areas during erection.

Lights, Convenience Outlet, and Space Heaters

A convenience outlet and a light switch for the internal housing light are provided on the exterior of the housing. The outlet, light switch, and light fixture are the weatherproof type. Space heaters are provided to minimize the occurrence of condensation during shutdown. The voltage and wattage for these heaters is shown on Figure 7, Collector Instrumentation Wiring.

NOTE

Energize the space heaters only when the unit is shut down and on turning gear, or at standstill.

Terminal Boards and Ground Pads

Power wiring and instrumentation wiring are routed separately. All wiring terminates at terminal boards located on the base and terminates with insulated ring tongue crimp terminals. Plugs are provided to permit disconnecting the housing wiring from the base to facilitate removing the house. Two grounding pads are provided for grounding the base. Additional grounding pads are located near the terminal strips for instrument grounding, if desired.

INSTALLATION

Receiving and Handling

The collector set is shipped to the site after being completely assembled in the factory. The collector rotor is supported by a shipping brace at the generator coupling end that must be removed during installation. See Figure 1. A few collector parts are packaged separately (such as coupling bolts). When the collector and separate shippable components are received at the power station, open each one and verify the contents against the shipping list. Thoroughly inspect the contents for shipping damage or other damage. Submit any claims for shipping damage to the carrier. The local Siemens Westinghouse office can assist in any claims filed against the carrier. Contact Siemens Westinghouse for any shortages.

Once inspections have been made for order completeness and freedom from damage, store the collector in a dry area relatively free from contaminants. Use plastic drop cloths to protect any materials placed in staging areas during erection.

Erection

Before installing the collector set, megger the generator rotor winding at 500 volts DC to determine its condition. A result of less than 50 megohms for initial installation and 10 megohms for subsequent reassembly should be investigated. Refer to Figure 1, Collector Assembly, Field, and to Figure 2, Installation and Removal.

1. The base with the seating plate attached (if applicable) is temporarily set to a position so that the brush rigging can be centered around the shaft using no more than 3.18 mm (0. 125 inch) of shims. The seating plate is then grouted and bolted to the foundation. (See note on centering the brush rigging around the shaft.)
2. The collector shaft is assembled to the generator shaft and the shipping brace is removed,
3. The bearing pedestal is shimmed to obtain correct elevation-the elevation is right when the shaft is centered in the bearing.
4. The brush holders are fitted to the brush rigging according to Figure 5, Brush Holder Module Installation but only after using the provided shims to align the brush rigging for equal clearance to the brush holder supports,
5. Instrumentation and power wiring is connected to the terminal boards on the base and the main DC power cables are connected to the main leads (see Figure 7, Collector Instrumentation Wiring).
6. The oil supply pipe is connected using the provided orifice and insulating hardware. The drain pipe is connected along with the sight-flow-glass and oil drain thermometer well.
7. The house is lowered over the collector assembly, bolted to the seating plate, wiring connected, and adjusted to form a watertight interface with the generator.

NOTE

When shimming the brush rigging to its final position, the clearance between the collector rings and the brush holder supports (Figure 4, Brush Holder Module) must be made uniform. This is important for assuring that brush holders will each have about the same clearance to the rings no matter which position they occupy and that the spare brush holder can be used in any position. Use shims under the base and brush rigging to obtain the uniform clearance. The clearance is measured from each of the brush holder supports to the collector rings.

OPERATION

WARNING

The flexible leads to each brush must not restrain the brushes from radial movement. The brush leads are designed to prevent worn brushes from falling out the end of the brush box. Serious ring and brush holder damage could result from reduced pressure of the brush against the rings if the brush becomes so worn that these leads are holding back the brush.

CAUTION

Before beginning operation after any shutdown, check each brush holder to make certain that it is properly engaged into the brush holder support, and that the brush retainer spring is clear of the brushes.

Collector Rings and Brushes

Before start-up, check the brush rigging:

1) Be certain that the brushes ride properly on the collector rings.

2) Ensure that the brushes are free in the brush boxes.

3) Make certain that proper brush pressure is established.

When checked with a scale, the constant force spring should be exerting 1.4 to 1.8 kilograms-force (3 to 4 pounds) on the brush (refer to Brush Holder Module, Figure 4).

After start-up, make a visual inspection of the brush and ring area, noting anything unusual. With the housing light off, check for sparking at the brushes. If sparking is present, this indicates a need for service as outlined in the section **INSPECTION AND MAINTENANCE.**

The collector set is designed to operate with a brush current density of 45–60 amp/in^2. Extended periods of operation outside of the specified range could result in poor brush performance or damage to the collector rings. Therefore, remove or add brushes or brush magazines as necessary to maintain proper brush current density. Each brush has an area of 1.5 in^2.

NOTE

Leave at least two completely filled brush magazines in a circumferential row to ensure even collector ring wear. Also, each collector ring should always have the same number of brushes in service.

Ventilation

For the collector to operate satisfactorily, adequate ventilation must be maintained. Filters must be replaced or cleaned when the filter differential pressure reaches the maximum allowed (a pressure drop resulting in a 10% reduction of flow). A switch is provided so that this condition can be alarmed. Both cold air and hot air RTDs are also provided. After operating the unit for some time, a trend or normal value for the air rise can be established. Deviation from this normal value should be investigated.

Shaft Vibration

Long brush life depends on maintaining low levels of shaft vibration at the collector rings. Sources of vibration can be unbalance and runout. Together, ring vibration must be kept below 0.13 mm (0.005 inch or 5 mils); and even better life will be obtained at lower levels of vibration. Should the collector shaft extension need to be balanced, refer to Figure 9, Collector Shaft Balance Planes, which shows the location for adding or removing weight. Also see the tabs, GENERATOR, INSPECTION AND MAINTENANCE, in the Generator Instruction Book.

Bearing

These collectors use a hydrodynamic type bearing as described on Figure 10, Bearing and Pedestal. Four spherically seated pads are spaced at plus and minus 45° from vertical top or bottom. These pads are pivoted and spaced from the shaft journal so that strong dynamic damping is obtained. Because the clearance from the pads to the shaft is small compared to many bearings, it is important to closely monitor the bearing performance characteristics and to take action immediately if performance begins to degrade.

On start-up, make sure that the correct quantity of oil is flowing to the bearing. The oil feed pressure can be used to determine the availability of oil. This oil should be no more than 62.7°C (145ºF). Inlet hot oil alarm is 68.3°C (155°F).

After temperatures have stabilized, the maximum oil discharge temperature should not exceed 160°F and should not exceed a 40°F rise. Monitor the bearing metal temperature during operation so that any sudden changes are detected and corrective action can be taken. Siemens Westinghouse experience indicates that malfunctions that affect bearing metal temperature have very fast time constants and action must be taken immediately to prevent additional problems. This table can be used as a guideline:

ALARM	107.2°C (225°F)
TRIP	112°C (235°F)

Vibrometers mounted on the bearing pedestal are used to measure peak-to-peak vibration at the journals. This table can be used to establish the allowable vibration limits:

ALARM	0.005-in. da
TRIP	0.010-in. da

Anytime that normal running cannot be done within these limits, balancing of the shaft train will be necessary.

INSPECTION AND MAINTENANCE

<u>WARNING</u>

Hazardous voltage is present between some parts of the brush rigging. This can cause severe injury or death. Wear insulating

gloves. Follow the instructions in "General" below.

The rotating shaft can cause severe injury or death. Stay clear of rotating parts when changing brush holders. Wear eye protection.

WARNING

When first removed, metal parts of the brush holders may be as hot as 100ºC (212°F). Do not touch with bare hands.

CAUTION

High noise area. Use hearing protection when the collector doors are opened.

General

Never touch parts that are energized while the unit is in service. If any work is needed on the brushes or a brush holder, remove the brush holder first (using the insulated handle) and follow the instructions given on Figure 5, Brush Holder Module Installation.

Generator Collector Rings and Brush Maintenance

The collector rings and brushes for turbine generators will give excellent service if properly maintained. Improperly maintained brushes may be the source of serious difficulties. The following daily, weekly, and shutdown maintenance schedules are recommended as a means of ensuring that the collector rings and brushes will continue to operate satisfactorily.

Daily Maintenance

Since trouble can develop suddenly, the following daily visual inspection of the brushes and rings is recommended:

1. Check the constant force spring shown on Figure 4, Brush Holder Module, to determine if it is in the correct location on top of the brush. If the spring rides off the brush, it could cause selective action that could lead to overheating or burning of a brush and brush holder.
2. Visually check that no brushes are being restrained from movement by the brush's leads. See CAUTION under the **OPERATION** section.
3. Check for sparking between brushes and collector rings. If sparking is observed, proceed as outlined under the weekly maintenance schedule.

Weekly Maintenance

The weekly maintenance described in the following paragraphs is recommended:

1. Remove one brush holder module and vacuum the dust from the brush boxes and adjacent parts.

CAUTION

Never remove more than one brush holder per polarity during operation.

An accumulation of dust can cause breakdown of the insulation and sticking of the brushes in the holder. (If a brush holder is removed from the brush rigging for more than 10 minutes, place a spare brush holder into that position.)

2. With one brush holder removed from the collector, take hold of each brush shunt and move the brushes up and down in their boxes to shake out dust and check freedom of movement. If the brush is not free, check the clearance by inserting a piece of fish paper or a feeler gauge between the brush and brush holder. The specified clearance is 4 to 6 mils (0.10 to 0.15 mm).

3. Check the brushes from the removed brush holder to determine if any are worn enough to require replacement. Figure 4, Brush Holder Module, shows when to replace worn brushes. Contact Siemens Westinghouse to order the correct brush, and refer to Figure 5, Brush Holder Module Installation. Figure 8 is the brush itself. Brushes can be replaced in a brush holder module at a remote location by making use of a spare brush holder, or by operating with one brush holder removed.

NOTE

Sanding is not necessary if the correct brush is used, since this brush is supplied with the proper radius.

If brushes without a radius are purchased, it is recommended they be sanded to the specified radius on the bench, using a tool constructed with the same diameter as the collector rings.

When replacing more than half of the brushes on a ring at one time, refer to Step 5 in Shutdown Maintenance, following.

4. Check the collector ring vibration. If the brushes are riding roughly, the collector rings should be carefully examined at the next shutdown to determine whether reconditioning is necessary.

5. When a brush holder module is removed, carefully examine it for signs of distress such as loose hardware, cracked constant force springs, other cracks, and overheated areas. Also check the insulated handle, shown in Figure 6. The operation of the handle may be improved by lubricating the linkage.

Shutdown Maintenance

During a scheduled shutdown, the brush and ring assembly should be inspected and serviced as follows:

CAUTION

Never use silicone-based products, such as RTV rubber, inside the collector housing or in the vicinity of the air inlets. Extreme degradation of the collector rings can result from the presence of these compounds.

Never use chlorine-based solvents on the collector parts. Use of these products may adversely affect the film on the collector ring surface.

1. Perform the daily and weekly maintenance, omitting the checks for sparking and smoothness (since the generator must be operating for these checks).

2. Inspect the collector and brush rigging for evidence of oil or dirt. If these are found to be present, the parts should be washed with Stoddard solvent and then dried. If repainting is required, use Specification 32230CE Air Drying Enamel.

3. If the weekly maintenance inspection indicates rough operation, check the collector rings to be sure they have no more than 0.04-mm (0.001 inch or 1 mil) runout. Burned or scored collector rings must be ground and polished to restore a smooth condition [0.2 microns (8 micro-inches)].

NOTE

Contact the local Siemens Westinghouse office for assistance if grinding and polishing are necessary.

Note that Figure 5, Brush Holder Module Installation, gives the procedure for resetting the brush holders when necessary [clearance to ring 3.18 mm (≥ 0.125 inch)] after rings are ground.

4. Defective brush holders should be replaced or repaired. Contact Siemens Westinghouse for ordering information. Alternately, Siemens Westinghouse can overhaul the brush holders to a like-new condition. If the owner wishes to repair the brush holder, sufficient information can be found on Figure 4, Brush Holder Module. Any further questions can be addressed to Siemens Westinghouse.

NOTE

If the brush holders are maintained on a regular schedule, the following is not necessary. This is done with brush holders removed.

5. Remove all brushes. Wipe the inside of the brush holder clean. Install new brushes where necessary; and wipe clean the remaining brushes before reinstalling them. When replacing brushes, fit new brushes to the ring surface by sanding to the collector ring radius, using a tool constructed for the purpose (not necessary if brushes are used that already have correct radiuses).

6. Check the alignment of the brush holders. They must be tight against the brush holder support, and be located 2.4 mm to 3.2 mm (0.095 to 0.125 inch) radially from the ring surface at the closest dimension. This clearance should be uniform along the length of the brush holder. If not, determine the source of the problem and correct it.

<u>WARNING</u>

Remove any foreign objects in cooling passages, because they impede heat transfer and could cause personal injury if thrown from the collector by centrifugal force during operation.

CAUTION

DO NOT score or deface the bore or inside surface of the collector ring when cleaning the collector bushing passages. This surface is silver plated and acts to prevent corrosion.

7. Keep helical vent passages (in the collector bushing, under the collector ring) clean by using a brass or nonmetallic cleaning brush or a gun bore cleaning type device. Ventilation through these passages is necessary for proper cooling. Any film, dirt, or other foreign material in these cooling passages will deter the intended heat flow from the ring surface to the air passing through the vent passages.

8. Periodically vacuum the accumulated carbon dust from inside the base. Access is from the fan inlet area.

9. Check for oil leaks around the bearing feed, the bearing drain, the oil seals and the pedestal. If present, establish the cause of the leakage and correct.

10. Before placing the unit back into service, a dielectric test can be performed at 4300 volts DC. Before making the test, disconnect the "butterfly" leads that connect the collector to the generator, and disconnect the extension leads from the exciter connection block. Also, perform a 500-volt megger on the collector set at the main leads, and on the exciter connection block. If the insulation resistance is not 50 megohms or more for new units, and 10 megohms or more for subsequent reassembly, clean and dry the exposed areas of insulation until 10 or more megohms are obtained at room temperature.

The dielectric test may then be performed by applying the test voltage to the main leads. Apply for 15 seconds.

To eliminate the need for disconnecting the generator field, a reduced voltage test can be performed at 1000 volts DC. In this case, the combined insulation resistance must be 10 megohms or more. Check the exciter instructions to determine whether or not the exciter can be left connected while performing the reduced level test.

SIEMENS
Westinghouse

2326J73G01

COLLECTOR ASSEMBLY (FIELD)

Item	Description
001	COLLECTOR ASSEMBLY (SHOP)
002	SEATING PLATE ALTERATION
003	COLLECTOR HOUSING ASSEMBLY
004	MAIN LEAD GUARD FRAME
005	DOWEL PIN - 1.625 DIA
006	DOWEL PIN
007	PLATE
008	COUPLING SCREW ASSEMBLY
009	COUPLING SHEAR SLEEVE
010	COLL OVER THE COUPLING LEAD
011	DRIVING STRIP + SLIP LAYER
012	LEAD SLOT WEDGE
013	FOUNDATION BOLT EXTENSION
014	COLL SFT COUPLING GUARD
015	BRG BRKT OIL SEAL EE (SPL)
016	BRG OIL SEAL GASKET
017	BOLT-HEX HD .625-11 X 2.25
018	NUT-HEX STL 1.750-5
019	SCREW, JACK 1.000-8
020	BOLT-HEX 1.000-8 X 2.75
021	BOLT HEX STL .375-16X1.00
022	BOLT-HEX STL 1.250-7 X 3.00
023	WASHER, STD STL 1.250
024	LOCKTITE-10CC BOTTLE
025	COLLECTOR BASE SHIMS
026	BOLT HEX STL, 1.000-8X1.75
027	WASHER STL WIDE 1.000
028	PANTLEG - LOCK PLATE
029	SQ. DOWEL WASHER (1.000)
030	DOWEL, ALIGNMENT
031	PANTLEG - LOCK PLATE
032	WASHER STL WIDE .375
033	WASHER
034	WASHER
035	INSULATION TUBE
036	ADHESIVE, SPRAY 16 OZ CAN
037	LWT FILLER
038	LWT FILLER
039	BOLT, STL HEX .375-16X1.75
040	LWT SEALING MATERIAL
041	LWT SEALING MATERIAL
042	LWT SEALING MATERIAL
043	LWT SEALING MATERIAL
044	LWT SEALING MATERIAL
045	LWT SEALING MATERIAL
046	LWT SEALING MATERIAL
047	LWT SEALING MATERIAL
048	BOLT HEX HD .500-13 X 1.75
049	PANTLEG - LOCK PLATE
050	OIT SPACER
051	LWT SEALING MATERIAL
052	CEMENT RUBBER 1 QT

BEARING AND PEDESTAL ASSEMBLY

ITEMS	DESCRIPTION
001	BEARING & PEDESTAL ASSEMBLY
003	PEDESTAL FINAL MACH
004	COLL BRG MACH & ASSY
005	BRG PED OIL SEAL (LH)
006	BRG PED OIL SEAL (RH)
007	GASKET, FIBER NITRILE RUBBER
008	PIPE PLUG
009	ADAPTER
010	BOS 0-RING
011	PSMA2 PIPE
012	COUPLING-PIPE SCW STL
013	SQ HD PIPE PLUG
014	BOLT HEX STL
015	PLUG-PIPE HEX SKT SCRD
016	PLUG PIPE SQ HD CI
017	BLIND FLG
018	GASKET FIBER RUBBER
019	BOLT-HEX STL
020	PANTLEG - LOCK PLATE
021	SCR SET SQ FD PT
022	PLUG - CAP
023	WASHER-STANDARD STEEL
024	LOCKTITE
025	PLUG-PIPE HEX SKT SCRD
026	BOLT, HEX STL
027	BOLT-HEX STL
028	WASHER
029	BEARING OIL SEAL
030	BRG OIL SEAL RETAINER
031	BRG OIL SEAL RETAINER
800	SPC PAINT-SLUSH-TURBINE GEN
801	SPC ASSY-WASHER & LOCKING DEVICE

Governor Valves

The governor valves for unit 1 were disassembled and inspected by RSO personnel under job order 3349032-01.

The governor valve spring cans were removed and the governor valves were unbolted and removed from the steam chest. The valve crossheads were removed from the stems and the stems were removed from the bonnets.

The stems and bushings were miced and the clearances were compared with designed operating limits. The stems were all checked for runout. Two of the stems had to be replaced. Spare stems and disks from Mitchell stores were used on governor valves #2 and #6. All of the stems were cleaned and polished in a lathe to remove the heavy scale on them.

All valve components were blast cleaned and NDE inspected. The bushings for 4 valves had minor cracks in the bushing where it was welded to the bonnets. These areas were weld repaired by CMS personnel on site.

The studs for the governor valve were cleaned and then checked using ultrasonic NDE techniques. All studs were suitable for reuse.

Two governor valve bonnets were sent to CMS for repairs. Valve #7 had a cut in the gasket surface for one of the leak off flanges. Valve #3 had a steam cut along the bonnet gasket fit. Both valves were repaired at CMS.

The valve springs were blast cleaned and NDE inspected. The springs were sent to Federal Industrial's shop where they were shot peened and painted.

The interior of the valve casings and the horizontal joint of the valve casings were blast cleaned. The valve seats were inspected and 5 of them were badly steam eroded around the seating area. Westinghouse shop personnel repaired the seats by grinding out the stellite, performing a weld repair with stress relief, and machining the seat contour back into place. The seats were lapped until 100% contact with each disk was achieved. Westinghouse also restored the fit for the bonnets. CMS provided all NDE for the seat repairs.

The linkage adjusting nuts were all loosened and relubricated. Two of the linkage nuts galled during disassembly and had to be replaced with spares. All of the servomotors were sent out by Mitchell ICT and were rebuilt.

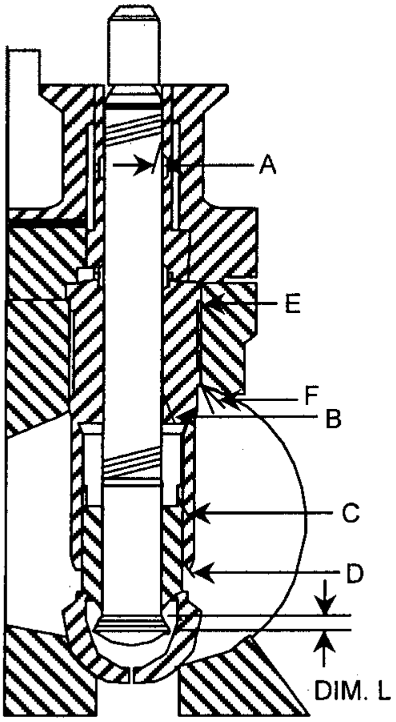
The valves were reassembled in the bonnets and the crossheads were pinned. The valve casings were lapped on the horizontal joint until 100% contact was achieved with the valve bonnets. The valve bonnets were reinstalled in the valve chest and all nuts were torqued to Westinghouse specifications using a Plarad hydraulic wrench. Note that one nut had to be replaced due to damaged threads.

The spring cans were installed and the servomotors were reconnected. 1/2" overtravel was set form each valve servomotor. The valves were stroked and the adjusting linkages were set under the direction of a Westinghouse Service Rep. The Belleville washers were set during unit start-up.

SIEMENS
WESTINGHOUSE

CUSTOMER: AEP	
LOCATION/UNIT #: MITCHELL 1	
GOVERNOR VALVE DIMENSIONS	
BB/FRAME:	JOB NO.:
COMPONENT/S.O.:	DWG.:

Valve Test # ___________



NO. _1__ VALVE DATA (AS FOUND)			
DIM.	O.D.	I.D.	CLR
A	1.738	1:76	0.022
B	1.734	1.751	0.017
C	4.176	4.185	0.009
D	4.176	4.193	0.017
E	5.580	5.643	0.063
F	5.577	5.707	0.130

STEM RUNOUT =	.004 TIR
DIMENSION L =	0.164

NO. _1__ VALVE DATA (AS LEFT)			
DIM.	O.D.	I.D.	CLR
A	1.735	1.760	0.025
B	1.734	1.751	0.017
C	4.176	4.185	0.009
D	4.176	4.193	0.017
E	5.58	5.582	0.002
F	5.577	5.582	0.005

DIMENSION L =	0.164

Tool # Used ________________________________ Cal. Due Date __________

As Found ___X_______ Reading Taken By: ____Ray Kinser_______________ Date: ___9/19/01___As_Found___
___10/16/01 __Final_______

As Assembled ____X______ Reviewed By (W) Eng.: ___________________________ Date: __________

FILE: GV004.PPT & CH1 Rev. 01

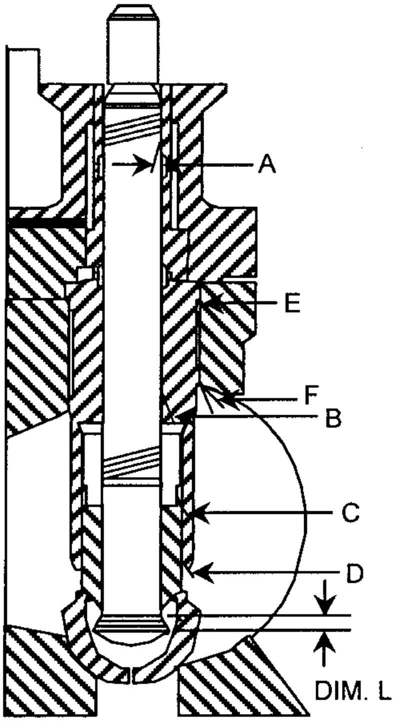
SIEMENS
WESTINGHOUSE

CUSTOMER: AEP
LOCATION/UNIT #: MITCHELL 1

GOVERNOR VALVE DIMENSIONS

BB/FRAME: JOB NO.:
COMPONENT/S.O.: DWG.:

Valve Test # ___________



NO. _2__ VALVE DATA (AS FOUND)			
DIM.	O.D.	I.D.	CLR
A	1.737	1.754	0.017
B	1.733	1.75	0.017
C	4.177	4.186	0.009
D	4.176	4.187	0.011
E	5.579	5.612	0.033
F	5.584	5.662	0.078

STEM RUNOUT =	.005 TIR (As Found)
DIMENSION L =	0.154

NO. _2__ VALVE DATA (AS LEFT)			
DIM.	O.D.	I.D.	CLR
A	1.737	1.754	0.017
B	1.737	1.75	0.013
C	4.173	4.186	0.013
D	4.173	4.187	0.014
E	5.579	5.586	0.007
F	5.584	5.587	0.003

DIMENSION L =	0.159

Note: New Stem and disk assembly installed for #2 valve.

As Found ___X_______

Reading Taken By: ____Ray Kinser_______________ Date: ___9/19/01___As_Found___
___10/16/01 __Final_______

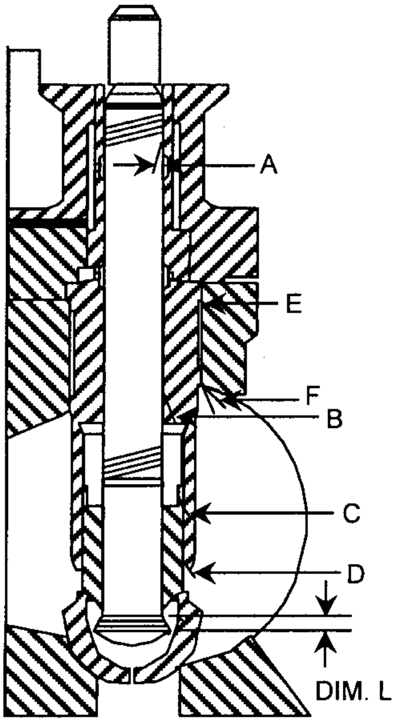
As Assembled ____X______

Reviewed By (W) Eng.: ________________________ Date: ___________

SIEMENS
WESTINGHOUSE

CUSTOMER:	AEP	
LOCATION/UNIT #:	MITCHELL 1	
GOVERNOR VALVE DIMENSIONS		
BB/FRAME:		JOB NO.:
COMPONENT/S.O.:		DWG.:

Valve Test # ___________



NO. _3__ VALVE DATA (AS FOUND)			
DIM.	O.D.	I.D.	CLR
A	1.739	1.751	0.012
B	1.735	1.75	0.015
C	4.176	4.186	0.01
D	4.175	4.187	0.012
E	5.583	5.617	0.034
F	5.582	5.721	0.139

STEM RUNOUT =	.002 TIR
DIMENSION L =	0.18

NO. _3__ VALVE DATA (AS LEFT)			
DIM.	O.D.	I.D.	CLR
A	1.737	1.751	0.014
B	1.729	1.75	0.021
C	4.167	4.186	0.019
D	4.165	4.187	0.022
E	5.583	5.585	0.002
F	5.582	5.585	0.003

DIMENSION L =	0.18

Tool # Used ______________________________ Cal. Due Date __________

As Found ___X_______ Reading Taken By: ____Ray Kinser_______________ Date: ___9/19/01___As_Found___
___10/16/01 __Final_______

As Assembled ____X______ Reviewed By (W) Eng.: _________________________ Date: __________

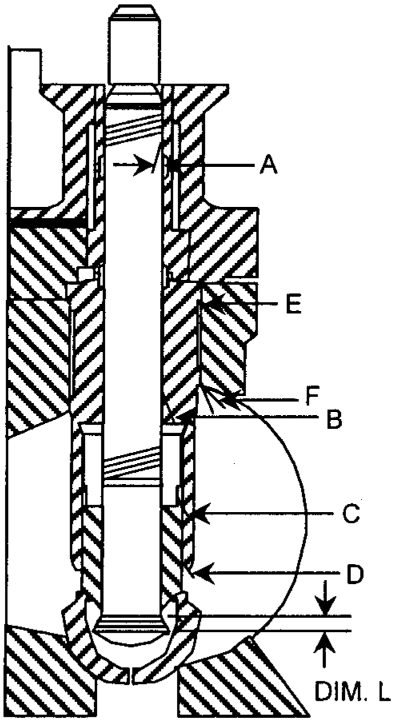
SIEMENS
WESTINGHOUSE

CUSTOMER: AEP
LOCATION/UNIT #: MITCHELL 1

GOVERNOR VALVE DIMENSIONS

BB/FRAME: JOB NO.:
COMPONENT/S.O.: DWG.:

Valve Test # ___________



NO. _4__ VALVE DATA (AS FOUND)			
DIM.	O.D.	I.D.	CLR
A	1.738	1.755	0.017
B	1.739	1.757	0.018
C	4.177	4.188	0.011
D	4.178	4.188	0.01
E	5.575	5.613	0.038
F	5.55	5.68	0.13

STEM RUNOUT =	.003 TIR
DIMENSION L =	0.165

NO. _4__ VALVE DATA (AS LEFT)			
DIM.	O.D.	I.D.	CLR
A	1.735	1.755	0.02
B	1.734	1.757	0.023
C	4.168	4.188	0.02
D	4.165	4.188	0.023
E	5.575	5.578	0.003
F	5.55	5.573	0.023

DIMENSION L =	0.165

Tool # Used ______________________________ Cal. Due Date __________

As Found ___X_______ Reading Taken By: ____Ray Kinser_______________ Date: ___9/19/01___As_Found___
____10/16/01 __Final_______

As Assembled ____X______ Reviewed By (W) Eng.: _________________________ Date: __________

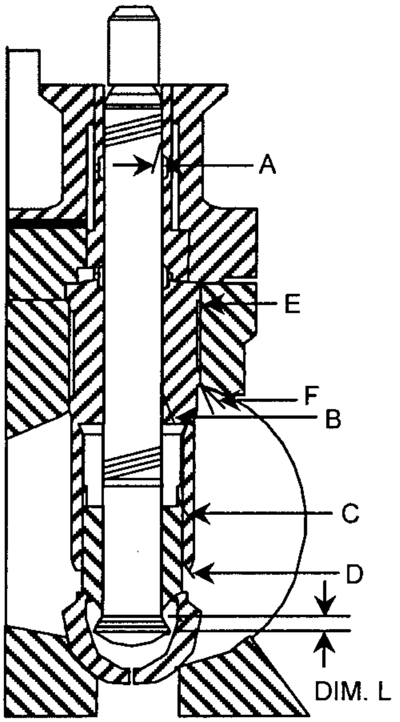
SIEMENS
WESTINGHOUSE

CUSTOMER:	AEP	
LOCATION/UNIT #:	MITCHELL 1	

GOVERNOR VALVE DIMENSIONS

BB/FRAME: JOB NO.:
COMPONENT/S.O.: DWG.:

Valve Test # ___________



NO. _5__ VALVE DATA (AS FOUND)			
DIM.	O.D.	I.D.	CLR
A	1.738	1.751	0.013
B	1.739	1.751	0.012
C	4.177	4.184	0.007
D	4.178	4.186	0.008
E	5.581	5.624	0.043
F	5.581	5.718	0.137

STEM RUNOUT =	.002 TIR
DIMENSION L =	0.112

NO. _5__ VALVE DATA (AS LEFT)			
DIM.	O.D.	I.D.	CLR
A	1.737	1.751	0.014
B	1.736	1.751	0.015
C	4.17	4.184	0.014
D	4.167	4.186	0.019
E	5.581	5.585	0.004
F	5.581	5.585	0.004

DIMENSION L =	0.112

Tool # Used ______________________________ Cal. Due Date __________

s Found ___X_______ Reading Taken By: ____Ray Kinser_______________ Date: ___9/19/01___As_Found___
___10/16/01 __Final_______

As Assembled ____X______ Reviewed By (W) Eng.: _________________________ Date: __________

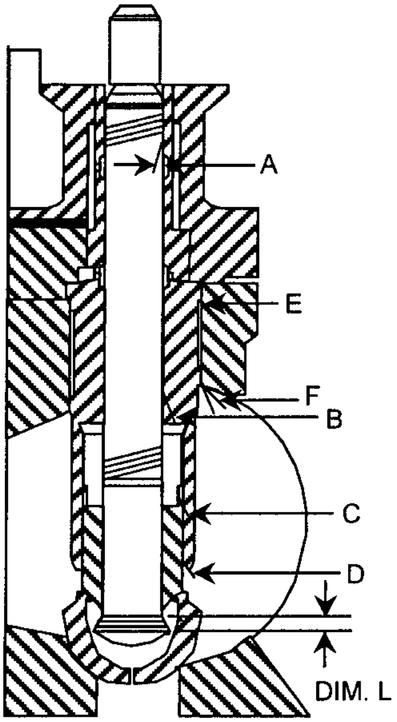
SIEMENS
WESTINGHOUSE

CUSTOMER:	AEP
LOCATION/UNIT #:	MITCHELL 1

GOVERNOR VALVE DIMENSIONS

BB/FRAME:	JOB NO.:
COMPONENT/S.O.:	DWG.:

Valve Test # ___________



NO. _6__ VALVE DATA (AS FOUND)			
DIM.	O.D.	I.D.	CLR
A	1.737	1.750	0.013
B	1.739	1.752	0.013
C	4.177	4.182	0.005
D	4.174	4.186	0.012
E	5.577	5.614	0.037
F	5.580	5.69	0.110

STEM RUNOUT =	.005 TIR
DIMENSION L =	0.131

NO. _6__ VALVE DATA (AS LEFT)			
DIM.	O.D.	I.D.	CLR
A	1.738	1.750	0.012
B	1.737	1.752	0.015
C	4.174	4.182	0.008
D	4.174	4.186	0.012
E	5.577	5.583	0.006
F	5.580	5.582	0.002

DIMENSION L =	0.120

Note: New Stem and disk assembly installed for #6 valve.

As Found ___X_______

Reading Taken By: ____Ray Kinser_______________

Date: ___9/19/01___As_Found___
___10/16/01 __Final_______

As Assembled ____X______

Reviewed By (W) Eng.: _________________________

Date: __________

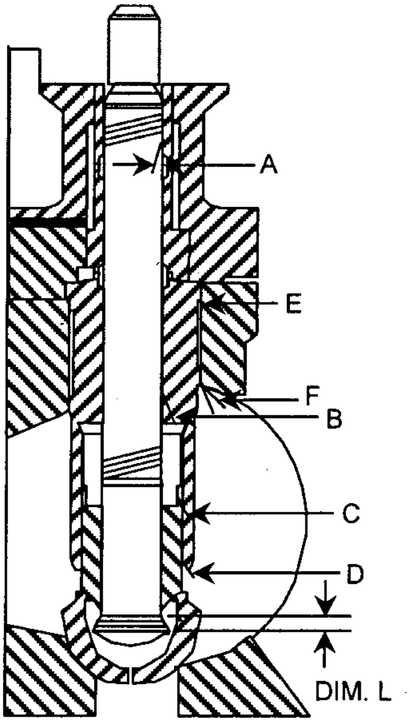
SIEMENS
WESTINGHOUSE

CUSTOMER:	AEP
LOCATION/UNIT #:	MITCHELL 1

GOVERNOR VALVE DIMENSIONS

BB/FRAME:	JOB NO.:
COMPONENT/S.O.:	DWG.:

Valve Test # ___________



NO. _7__ VALVE DATA (AS FOUND)

DIM.	O.D.	I.D.	CLR
A	1.737	1.752	0.015
B	1.739	1.751	0.012
C	4.177	4.187	0.01
D	4.179	4.188	0.009
E	5.581	5.636	0.055
F	5.581	5.712	0.131

STEM RUNOUT =	.006 TIR
DIMENSION L =	0.095

NO. _7__ VALVE DATA (AS LEFT)

DIM.	O.D.	I.D.	CLR
A	1.737	1.752	0.015
B	1.738	1.751	0.013
C	4.173	4.187	0.014
D	4.171	4.188	0.017
E	5.581	5.587	0.006
F	5.581	5.587	0.006

DIMENSION L =	0.095

Tool # Used ______________________________

Cal. Due Date __________

As Found ___X_______

Reading Taken By: ____Ray Kinser_______________

Date: ___9/19/01___As_Found___
___10/16/01 __Final_______

As Assembled ____X______

Reviewed By (W) Eng.: _________________________

Date: __________

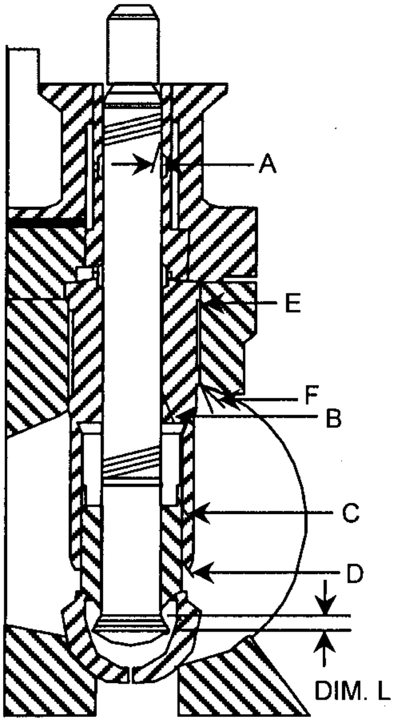
SIEMENS
WESTINGHOUSE

CUSTOMER: AEP
LOCATION/UNIT #: MITCHELL 1

GOVERNOR VALVE DIMENSIONS

BB/FRAME: JOB NO.:
COMPONENT/S.O.: DWG.:

Valve Test # ___________



NO. _8__ VALVE DATA (AS FOUND)			
DIM.	O.D.	I.D.	CLR
A	1.739	1:75	0.011
B	1.74	1.75	0.01
C	4.177	4.185	0.008
D	4.178	4.19	0.012
E	5.578	5.612	0.034
F	5.58	5.646	0.066

STEM RUNOUT =	.005 TIR
DIMENSION L =	0.088

NO. _8__ VALVE DATA (AS LEFT)			
DIM.	O.D.	I.D.	CLR
A	1.738	1.75	0.012
B	1.735	1.75	0.015
C	4.169	4.185	0.016
D	4.164	4.19	0.026
E	5.578	5.583	0.005
F	5.58	5.582	0.002

DIMENSION L =	0.088

Tool # Used ______________________ Cal. Due Date __________

As Found ___X_______ Reading Taken By: ____Ray Kinser_______________ Date: ___9/19/01___As_Found___
___10/16/01 __Final_______

As Assembled ____X______ Reviewed By (W) Eng.: ________________________ Date: __________

SIEMENS
WESTINGHOUSE

CUSTOMER: AEP
LOCATION/UNIT #: MITCHELL 1

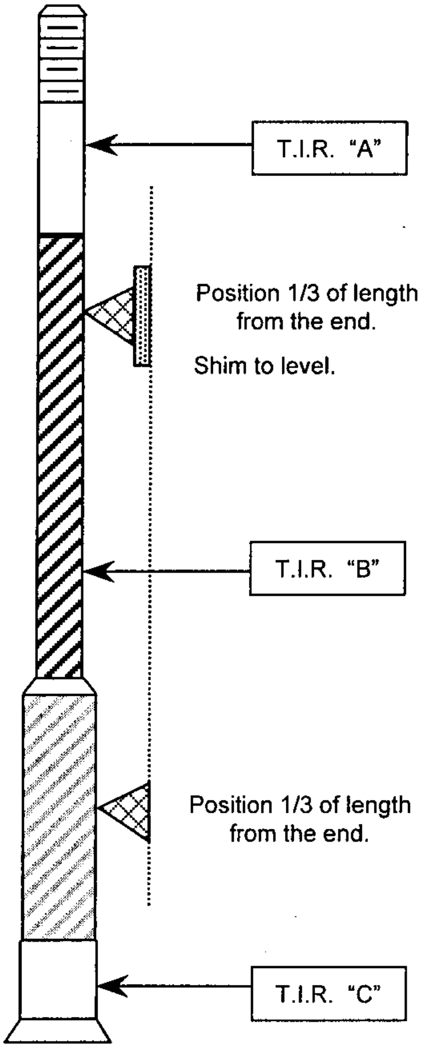
GOVERNOR VALVE STEM RUNOUT

BB/FRAME: JOB NO.:
COMPONENT/S.O.: DWG.:

Valve Test # ___________

Total T.I.R. Equals B Plus the Largest of A or C.

Total T.I.R. ___________



As Found Data

Valve #	A	B	C
1	-0.001	0.000	0.003
2	-0.002	0.000	-0.005
3	0.000	-0.002	-0.002
4	0.002	0.000	-0.001
5	0.000	-0.001	0.001
6	0.002	0.002	0.005
7	0.003	-0.003	-0.001
8	0.001	-0.002	0.003

Final Data

Valve #	A	B	C
1	-0.001	0.000	0.003
2	0.000	0.000	0.000
3	0.000	-0.002	-0.002
4	0.002	0.000	-0.001
5	0.000	-0.001	0.001
6	0.000	0.000	0.000
7	0.003	-0.003	-0.001
8	0.001	-0.002	0.003

Tool # Used ________________________________ Cal. Due Date ___________

As Found ____X______ Reading Taken By: _____Ray Kinser_________________ Date: _9/19/01______

As Assembled ____X______ Reviewed By (W) Eng.: _______________________________ Date: ___________

Throttle Valves

The throttle valves for unit 1 were disassembled and inspected by RSO personnel under job order 3349032-02.

The throttle valve spring cans were removed and then the servomotors were removed from the valves. The throttle valve bonnets were unbolted and removed from the steam chest. The valve crossheads were removed from the stems and the stem/disk assemblies were removed from the bonnets. The valve disks were completely disassembled to allow inspection of the pilot valves. The pilot valves were removed from the stems for inspection as well.

All valve components were blast cleaned by Federal Industrial and NDE inspections were performed by CMS personnel. All stems, bushings, crossheads, and pilot valve fits were miced and the clearances were compared with designed operating limits. The stems were all checked for runout.

The stems for valve #1, 2, and 4 had to be replaced due to runout. The stem ends for valves #1, 3, and 4 were replaced along with the springs for the stem ends of all four valves. The pilot valve for throttle valve #1 had to be replaced due to internal clearances, and the pilot valve locking nuts for valves #1, 3, and 4 also had to be replaced due to internal clearance problems.

The main disks for valve #1 and #4 had heavy erosion at the seating area for the pilot valve and were replaced. These disks can be rebuilt and restocked. One stem bushing was in poor condition (damaged) and was replaced with a spare bushing.

The stem for valve #3 had heavy scale and was cleaned up and polished in a lathe. All of the throttle valve bushings were honed to remove scale.

The flex plates in all four throttle valve disks were removed. The screws for the flex plates were destroyed during the removal process and were replaced with spares. The flex plates were all cleaned up and were reused. Note that some of the peening lips for the screws will need to be repaired during the next outage.

All of the throttle valve studs were NDE'd using ultrasonic methods. A stud wobble test was done on all of the valve studs. One of the valve studs had too much wobble. The bolthole had an insert in it from a previous outage. This insert was removed and a new insert was installed. Changing the inserts corrected the stud wobble, so the new insert was seal welded in place.

The internals of the throttle valve casing were blast cleaned and NDE inspected. The trepan areas were in good condition, and the valve seats all passed NDE inspection. There were some minor cracks in the valve seat seal welds for throttle valves #1 and #2. These cracks were ground out and rewelded.

The stem ends were lapped to the pilot valves and the pilot valves were assembled. The spring movement of the stem ends was checked and adjusted as necessary by shimming to provide for proper bypass spring travel.

The pilot valves were lapped to the main disks until 100% contact was achieved. The stems wee then assembled to the disks without pinning the crossheads.

One throttle valve (#4) had a large crack running along the strainer. This throttle valve bonnet was sent to CMS and weld repaired. Fine mesh screen was installed on all of the valve strainers. A stitch weld using inconel rod was done to attach the fine mesh screen.

The valve bonnets were installed and all valve lift checks were done. The crossheads were machined to provide for proper pilot valve spring compression and then pinned to the stems. All crossheads were blue checked to ensure proper contract when back seating. The main disks to seats were contact checked and lapped to achieve 100% contact.

The valve bonnets were installed and the bolting was stretched to OEM specifications. All leak off lines were reassembled.

The spring cans were installed and the servomotors were reconnected. 1/2" over-travel was set form each valve servomotor. The valves were stroked and operated properly. The Belleville washers were set during unit start-up.

One item of note regarding the throttle valves. As was discovered during the hydro, neither the throttle valves nor the governor valves are designed to be water tight.

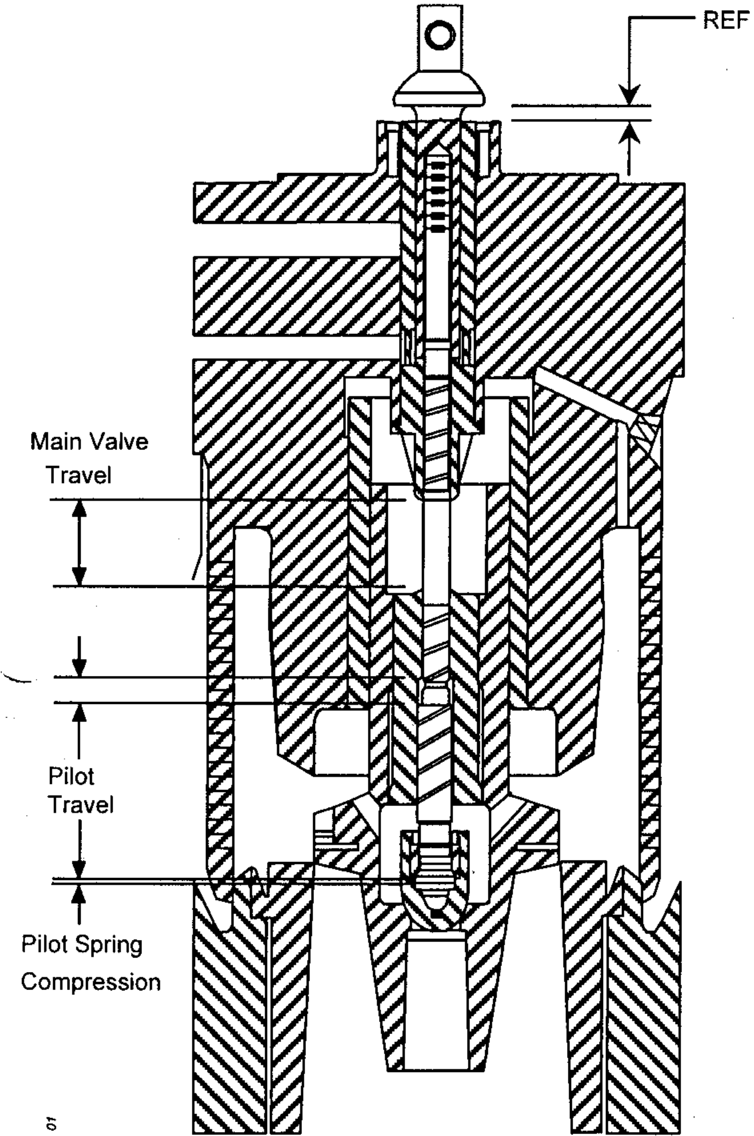
During a touch up outage, the fine mesh screen was removed from the strainers. The bonnets were reinstalled, and the over-travel of the servomotors was reset. All valves were verified by plant personnel to be backseating.

Siemens
Westinghouse

CUSTOMER: AEP	
LOCATION/UNIT #: MITCHELL 1	
THROTTLE VALVE	
BB/FRAME:	JOB NO.:
COMPONENT/S.O.:	DWG.:

Valve # ____1____

Spring Guide Shown Seated



AXIAL TRAVEL			
NUMBER	DESCRIPTION		DISTANCE
1	A1 SPRING GUIDE NOT SEATED		0.548
2	A2 SPRING GUIDE SEATED		0.656
3	STEM BACKSEATED		1.418
4	MAIN VALVE BACKSEATED		5.452

CALCULATED VALUES		
DESCRIPTION	DISTANCE CALCULATION	VALUE
PILOT SPRING COMPRESSION	#2 MINUS #1	0.108
PILOT TRAVEL	#3 MINUS #2	0.762
MAIN VALVE TRAVEL	#4 MINUS #3	4.034
TOTAL TRAVEL	#4 MINUS #2	4.796

LOCATION	VALVE # 1

FILE: TV011.PPT Rev. 01

Tool # Used ______________________ Cal. Due Date __________

As Found __________ Reading Taken By: ____Gary Rahn__________________ Date: _10/17/01__

As Assembled ____X______ Reviewed By (W) Eng.: ______________________ Date: __________

Siemens
Westinghouse

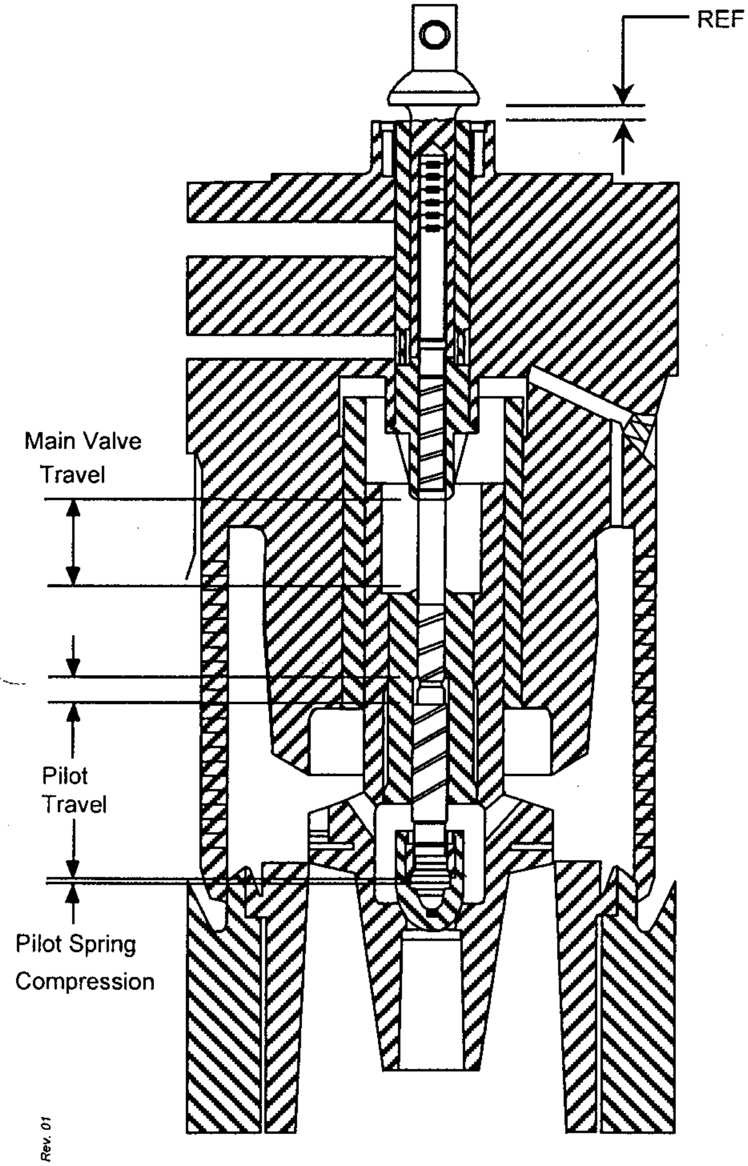
CUSTOMER: AEP
LOCATION/UNIT #: MITCHELL 1

THROTTLE VALVE

BB/FRAME: JOB NO.:
COMPONENT/S.O.: DWG.:

Valve # 2

Spring Guide Shown Seated



AXIAL TRAVEL			
NUMBER	DESCRIPTION		DISTANCE
1	A1 SPRING GUIDE NOT SEATED		0.584
2	A2 SPRING GUIDE SEATED		0.664
3	STEM BACKSEATED		1.380
4	MAIN VALVE BACKSEATED		5.566

CALCULATED VALUES		
DESCRIPTION	DISTANCE CALCULATION	VALUE
PILOT SPRING COMPRESSION	#2 MINUS #1	0.080
PILOT TRAVEL	#3 MINUS #2	0.716
MAIN VALVE TRAVEL	#4 MINUS #3	4.186
TOTAL TRAVEL	#4 MINUS #2	4.902

FILE: TV011.PPT Rev. 01

Tool # Used ____________ Cal. Due Date ________

As Found ________ Reading Taken By: Gary Rahn Date: 10/17/01

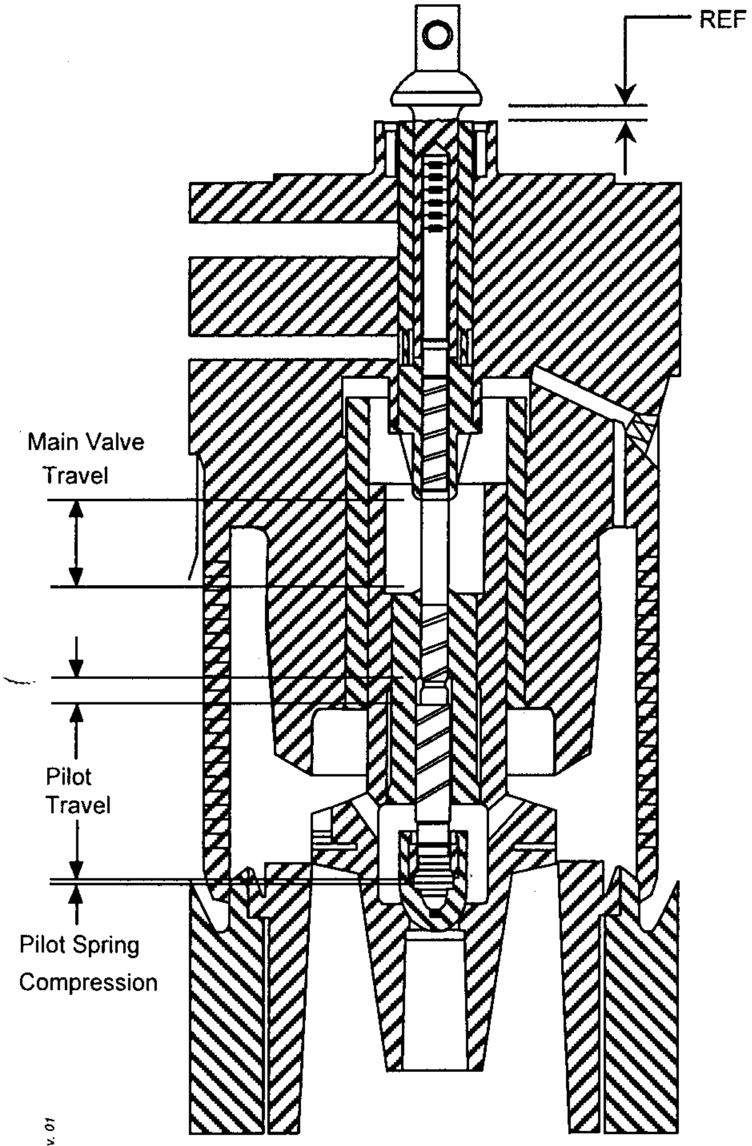
As Assembled X Reviewed By (W) Eng.: ____________ Date: ________

Siemens
Westinghouse

CUSTOMER: AEP	
LOCATION/UNIT #: MITCHELL 1	
THROTTLE VALVE	
BB/FRAME:	JOB NO.:
COMPONENT/S.O.:	DWG.:

Valve # _____3____

Spring Guide Shown Seated



LOCATION	VALVE # 3

AXIAL TRAVEL			
NUMBER	DESCRIPTION		DISTANCE
1	A1 SPRING GUIDE NOT SEATED		0.738
2	A2 SPRING GUIDE SEATED		0.818
3	STEM BACKSEATED		1.487
4	MAIN VALVE BACKSEATED		5.516

CALCULATED VALUES		
DESCRIPTION	DISTANCE CALCULATION	VALUE
PILOT SPRING COMPRESSION	#2 MINUS #1	0.080
PILOT TRAVEL	#3 MINUS #2	0.669
MAIN VALVE TRAVEL	#4 MINUS #3	4.029
TOTAL TRAVEL	#4 MINUS #2	4.698

Tool # Used ______________________________ Cal. Due Date __________

As Found __________ Reading Taken By: ____Gary Rahn__________________ Date: _10/17/01__

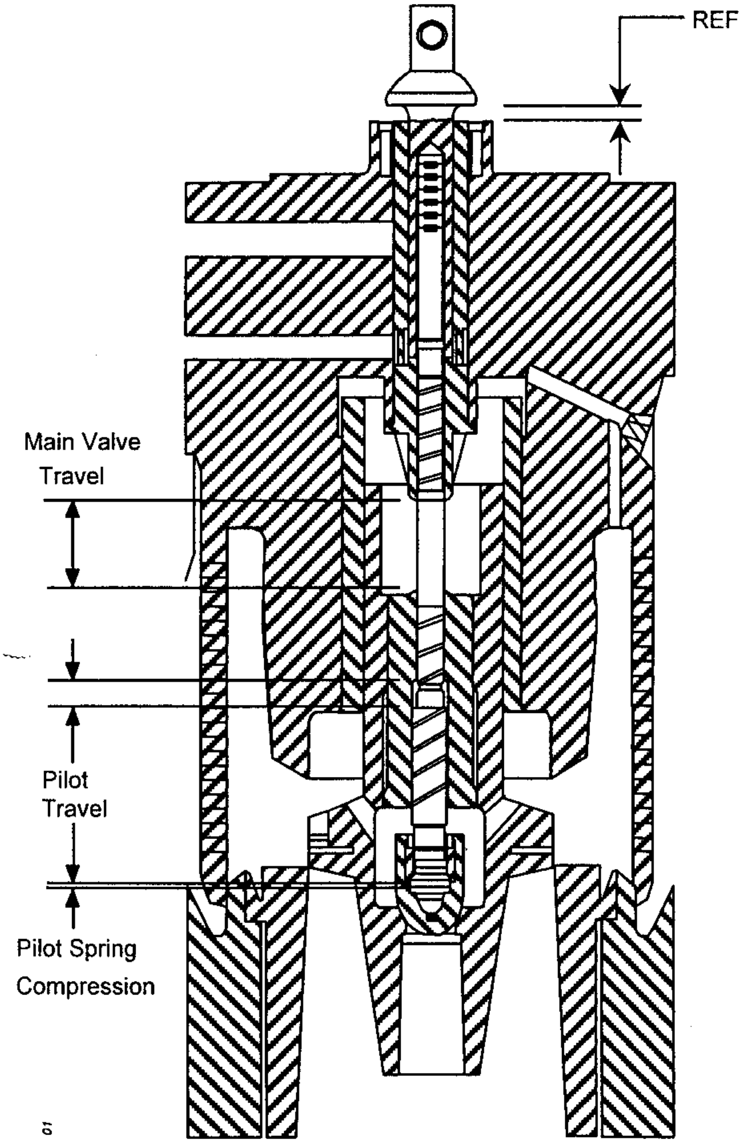
As Assembled ____X______ Reviewed By (W) Eng.: ______________________________ Date: __________

Siemens
Westinghouse

CUSTOMER: AEP	
LOCATION/UNIT #: MITCHELL 1	
THROTTLE VALVE	
BB/FRAME:	JOB NO.:
COMPONENT/S.O.:	DWG.:

Valve # 4

Spring Guide Shown Seated



LOCATION	VALVE # 4

FILE: TV011.PPT Rev. 01

AXIAL TRAVEL			
NUMBER	DESCRIPTION		DISTANCE
1	A1 SPRING GUIDE NOT SEATED		0.546
2	A2 SPRING GUIDE SEATED		0.623
3	STEM BACKSEATED		1.342
4	MAIN VALVE BACKSEATED		5.426

CALCULATED VALUES		
DESCRIPTION	DISTANCE CALCULATION	VALUE
PILOT SPRING COMPRESSION	#2 MINUS #1	0.077
PILOT TRAVEL	#3 MINUS #2	0.719
MAIN VALVE TRAVEL	#4 MINUS #3	4.084
TOTAL TRAVEL	#4 MINUS #2	4.803

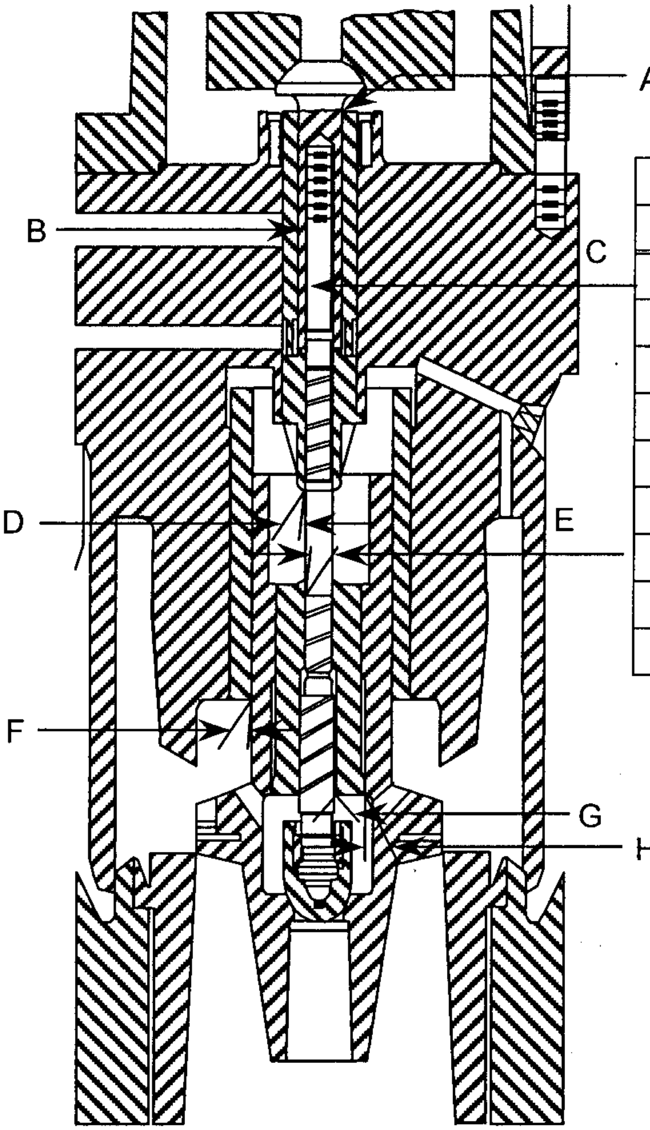
Tool # Used ______________________ Cal. Due Date __________

As Found __________ Reading Taken By: Gary Rahn Date: 10/17/01

As Assembled X Reviewed By (W) Eng.: ______________________ Date: __________

**SIEMENS
WESTINGHOUSE**

CUSTOMER: AEP	
LOCATION/UNIT #: MITCHELL 1	
THROTTLE VALVE	
BB/FRAME:	JOB NO.:
COMPONENT/S.O.:	DWG.:



THROTTLE VALVE CLEARANCES				
DIA	O.D.	I.D.	ACTUAL	DESIGN
A	2.112	2.124	0.012	.010/.013
B	2.112	2.125	0.013	.010/.013
C	1.381	1.393	0.012	.005/.007
D	1.488	1.500	0.013	.010/.013
E	1.488	1.498	0.010	.010/.013
F	5.487	5.492	0.005	.011/.017
G	1.925	1.935	0.010	.010/.013
H	3.806	3.810	0.004	.002/.005
I = RUNOUT = TIR 0.002"				0/.003

LOCATION _____#1 Gen end LS_________

Parts Replaced on Valve #1

Stem, Stem End, Spring, Spring Seat,
Pilot Valve, Pilot Valve Retaining Nut,
Main Valve Disk, 4 Screws to flex plate

FILE: TV013.PPT Rev. 00

Tool # Used ____________ Cal. Due Date ________

As Found ________ Reading Taken By: _______G. Rahn__________ Date: __9/27/01___

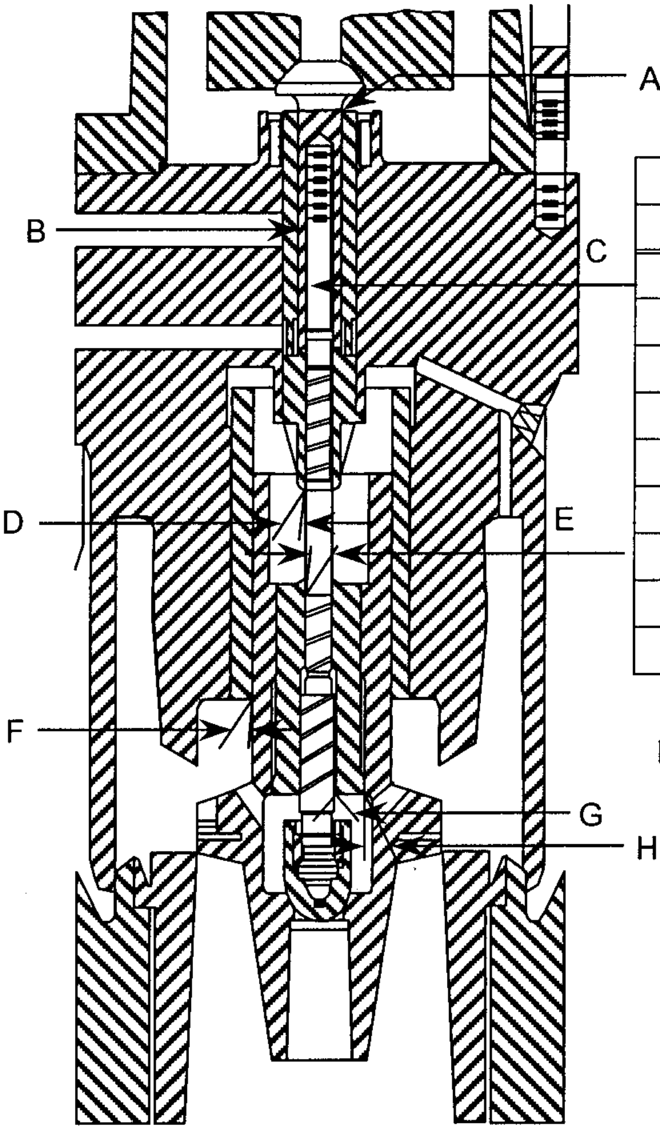
As Assembled ____X______ Reviewed By (W) Eng.: ____________ Date: ________

SIEMENS
WESTINGHOUSE

CUSTOMER: AEP
LOCATION/UNIT #: MITCHELL 1

THROTTLE VALVE

BB/FRAME: JOB NO.:
COMPONENT/S.O.: DWG.:



THROTTLE VALVE CLEARANCES				
DIA	O.D.	I.D.	ACTUAL	DESIGN
A	2.110	2.125	0.015	.010/.013
B	2.110	2.125	0.015	.010/.013
C	1.382	1.392	0.010	.005/.007
D	1.488	1.501	0.013	.010/.013
E	1.488	1.497	0.009	.010/.013
F	5.471	5.489	0.018	.011/.017
G	1.924	1.935	0.011	.010/.013
H	3.803	3.809	0.006	.002/.005
I = RUNOUT = TIR 0.002"				0/.003

LOCATION _____#2 Gen end RS_________

Parts Replaced on Valve #2

Stem, Spring, Spring Seat,

Pilot Valve Retaining Nut,

4 Screws to flex plate

FILE: TV013.PPT Rev. 00

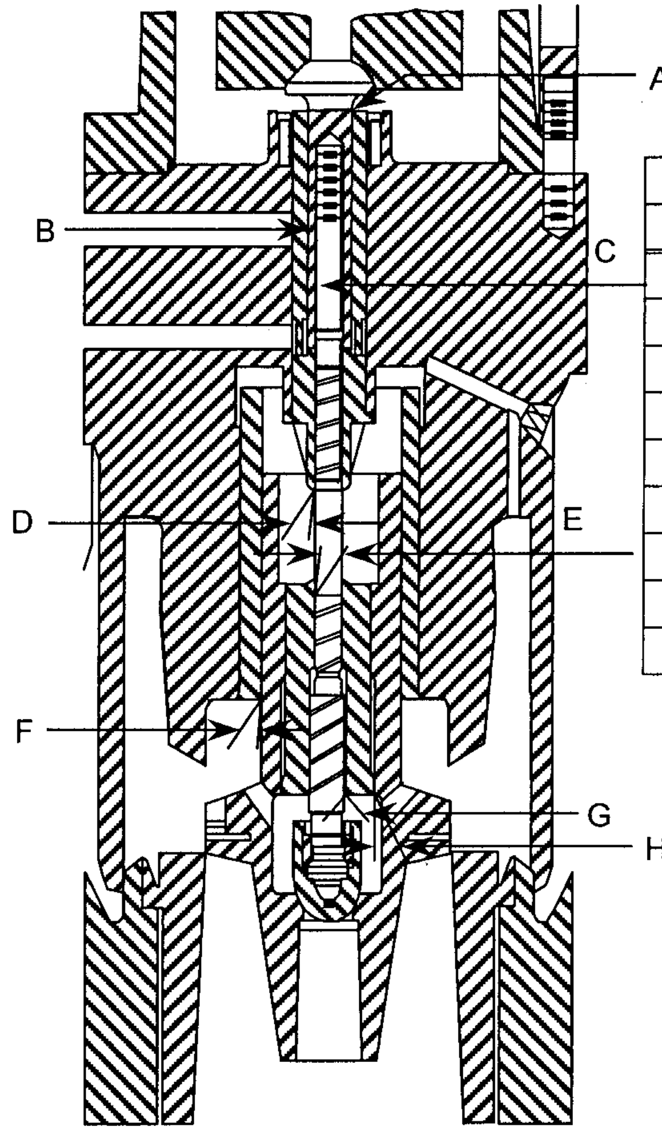
Tool # Used ______________________________ Cal. Due Date __________

As Found ____X______ Reading Taken By: _______G. Rahn__________________ Date: __9/25/01___

As Assembled __________ Reviewed By (W) Eng.: ______________________________ Date: __________

SIEMENS
WESTINGHOUSE

CUSTOMER: AEP	
LOCATION/UNIT #: MITCHELL 1	
THROTTLE VALVE	
BB/FRAME:	JOB NO.:
COMPONENT/S.O.:	DWG.:



THROTTLE VALVE CLEARANCES				
DIA	O.D.	I.D.	ACTUAL	DESIGN
A	2.114	2.125	0.011	.010/.013
B	2.115	2.124	0.009	.010/.013
C	1.380	1.388	0.008	.005/.007
D	1.485	1.497	0.012	.010/.013
E	1.486	1.498	0.012	.010/.013
F	5.475	5.492	0.017	.011/.017
G	1.926	1.936	0.010	.010/.013
H	3.807	3.812	0/.004	.002/.005
I = RUNOUT = TIR 0.003"				0/.003

LOCATION _____#3 Gov end LS________

Parts Replaced on Valve #3

Stem End, Spring, Spring Seat,
Pilot Valve Retaining Nut,
4 Screws to flex plate

FILE: TV013.PPT Rev. 00

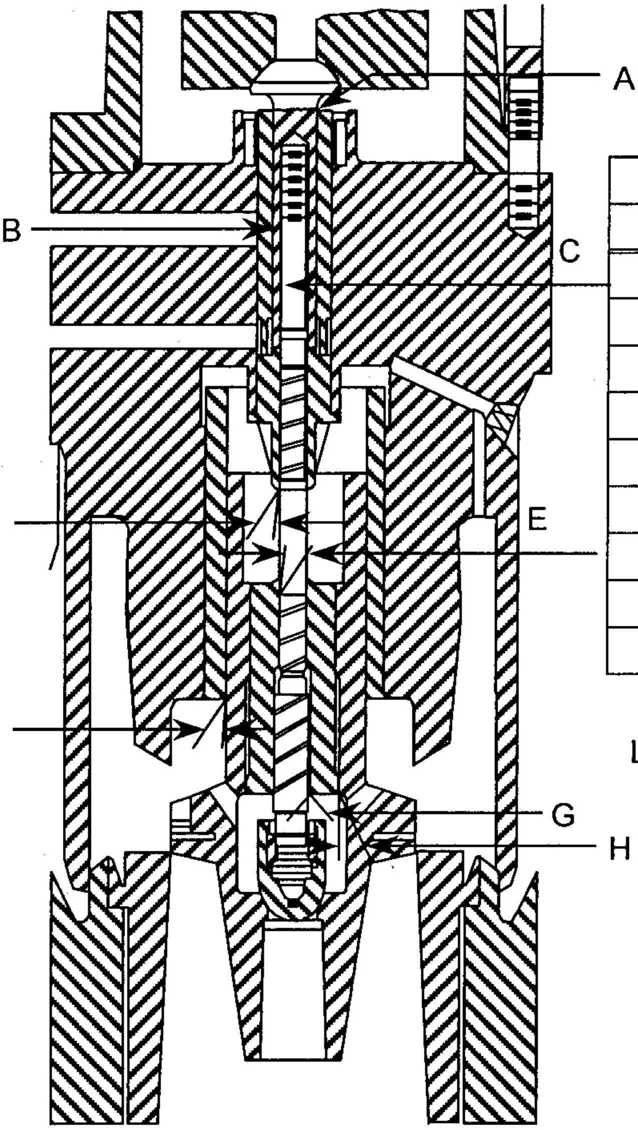
Tool # Used __________________ Cal. Due Date __________

As Found ____X______ Reading Taken By: _______G. Rahn________________ Date: __9/25/01___

As Assembled __________ Reviewed By (W) Eng.: ________________________ Date: __________

SIEMENS
WESTINGHOUSE

CUSTOMER: AEP	
LOCATION/UNIT #: MITCHELL 1	
THROTTLE VALVE	
BB/FRAME:	JOB NO.:
COMPONENT/S.O.:	DWG.:



THROTTLE VALVE CLEARANCES				
DIA	O.D.	I.D.	ACTUAL	DESIGN
A	2.110	2.125	0.015	.010/.013
B	2.112	2.125	0.013	.010/.013
C	1.381	1.393	0.012	.005/.007
D	1.488	1.500	0.012	.010/.013
E	1.488	1.498	0.010	.010/.013
F	5.482	5.490	0.008	.011/.017
G	1.925	1.935	0.010	.010/.013
H	3.804	3.812	0.008	.002/.005
I = RUNOUT = TIR .021				0/.003

LOCATION _____#4 Gov end RS_________

Parts Replaced on Valve #4

Stem, Stem End, Spring, Spring Seat,
Pilot Valve Retaining Nut,
Main Valve Disk, 4 Screws to flex plate

FILE: TV013.PPT Rev. 00

Tool # Used ______________________________ Cal. Due Date __________

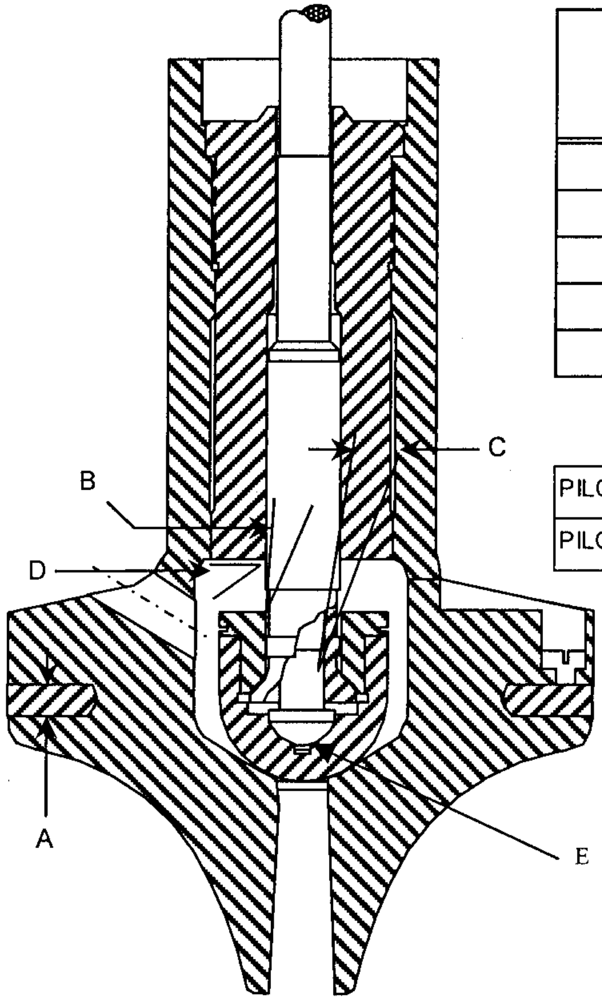
As Found ____X______ Reading Taken By: _______G. Rahn__________________ Date: __9/18/01___

As Assembled __________ Reviewed By (W) Eng.: ______________________________ Date: __________

SIEMENS
WESTINGHOUSE

CUSTOMER: AEP	
LOCATION/UNIT #: MITCHELL 1	
THROTTLE VALVE	
BB/FRAME:	JOB NO.:
COMPONENT/S.O.:	DWG.:

Valve #1 Gen End LS



DIM	O.D.	I.D.	ACTUAL CLR	DESIGN CLR
A	0.368	0.375	0.007	.004/.006
B	1.872	1.932	0.060	.057/.069
C	1.180	1.189	0.009	.010/.012
D	1.925	1.935	0.010	.010/.013
E	0.487	0.500	0.013	.012/.018

PILOT SPRING COMPRESSION =	0.460
PILOT INTERNAL TRAVEL =	0.180

Parts Replaced on Valve #1

Stem, Stem End, Spring, Spring Seat, Pilot Valve, Pilot Valve Retaining Nut, Main Valve Disk, 4 Screws to flex plate

Tool # Used ______________________ Cal. Due Date __________

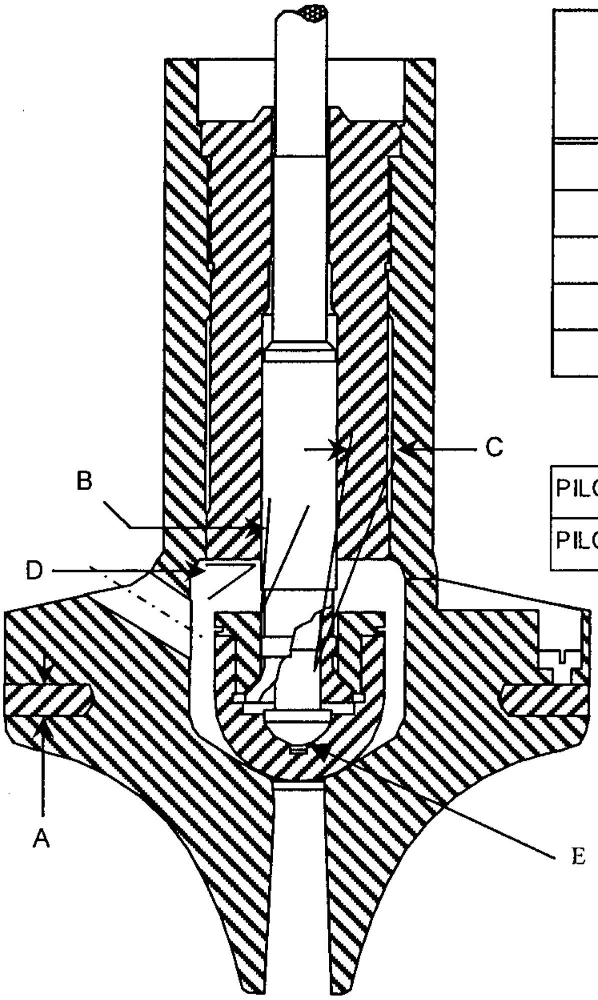
As Found __________ Reading Taken By: ______Rahn / Burnheimer_________ Date: _9/29/01___

As Assembled ____X______ Reviewed By (W) Eng.: ______________________ Date: __________

SIEMENS
WESTINGHOUSE

CUSTOMER: AEP
LOCATION/UNIT #: MITCHELL 1
THROTTLE VALVE
BB/FRAME: JOB NO.:
COMPONENT/S.O.: DWG.:

Valve #2 Gen End RS



DIM	O.D.	I.D.	ACTUAL CLR	DESIGN CLR
A	0.366	0.376	0.010	.004/.006
B	1.869	1.939	0.070	.057/.069
C	1.177	1.189	0.012	.010/.012
D	1.924	1.936	0.012	.010/.013
E	0.484	0.498	0.014	.012/.018

PILOT SPRING COMPRESSION =	0.433
PILOT INTERNAL TRAVEL =	0.183

Parts Replaced on Valve #2

Stem, Spring, Spring Seat,
Pilot Valve Retaining Nut,
4 Screws to flex plate

FILE: TV009.PPT Rev. 01

Tool # Used ______________________________ Cal. Due Date __________

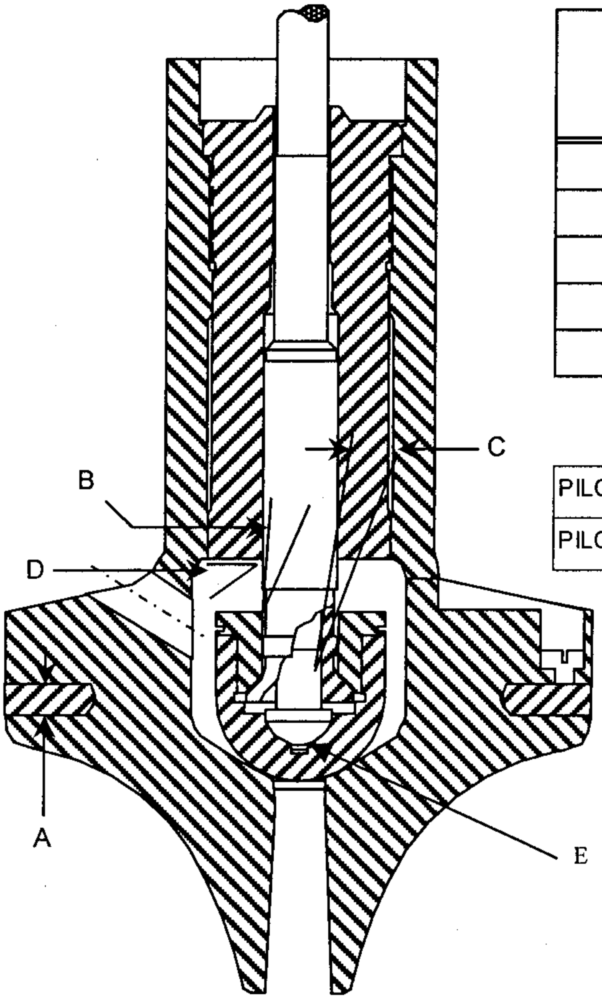
As Found __________ Reading Taken By: ______RAHN / Burnheimers_________ Date: _9/29/01___

As Assembled ____X______ Reviewed By (W) Eng.: ______________________________ Date: __________

SIEMENS
WESTINGHOUSE

CUSTOMER: AEP	
LOCATION/UNIT #: MITCHELL 1	
THROTTLE VALVE	
BB/FRAME:	JOB NO.:
COMPONENT/S.O.:	DWG.:

Valve #3 Gov End LS



DIM	O.D.	I.D.	ACTUAL CLR	DESIGN CLR
A	0.364	0.375	0.011	.004/.006
B	1.875	1.930	0.055	.057/.069
C	1.177	1.187	0.010	.010/.012
D	1.926	1.936	0.010	.010/.013
E	0.486	0.503	0.017	.012/.018

PILOT SPRING COMPRESSION =	0.460
PILOT INTERNAL TRAVEL =	0.200

Parts Replaced on Valve #3

Stem End, Spring, Spring Seat,
Pilot Valve Retaining Nut,
4 Screws to flex plate

FILE: TV009.PPT Rev. 01

Tool # Used ______________________________ Cal. Due Date __________

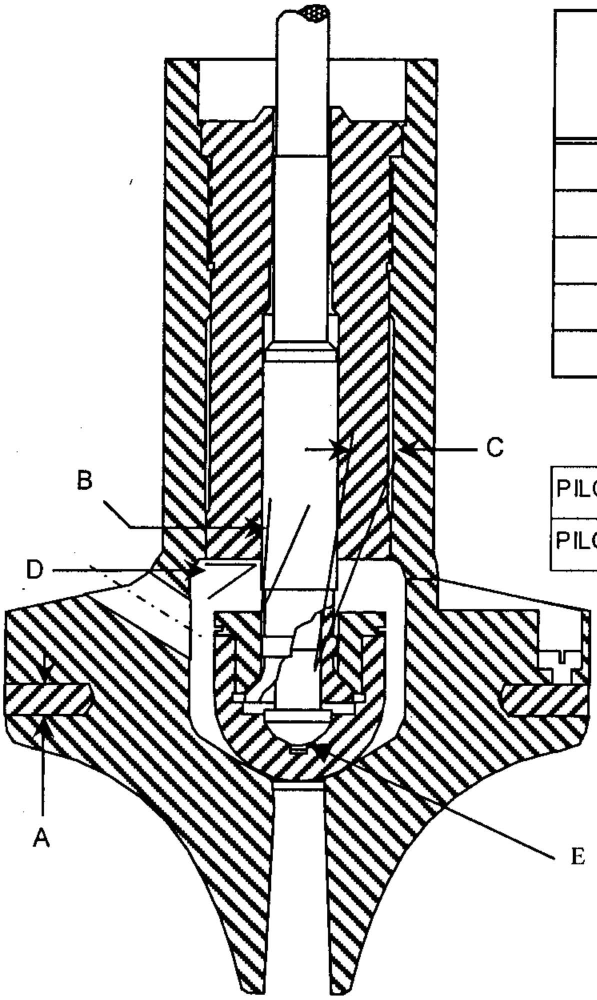
As Found __________ Reading Taken By: ______RAHN / Burnheimers__________ Date: _9/29/01___

As Assembled ____X______ Reviewed By (W) Eng.: ______________________________ Date: __________

SIEMENS
WESTINGHOUSE

CUSTOMER:	AEP	
LOCATION/UNIT #:	MITCHELL 1	
THROTTLE VALVE		
BB/FRAME:		JOB NO.:
COMPONENT/S.O.:		DWG.:

Valve #4 Gov End RS



DIM	O.D.	I.D.	ACTUAL CLR	DESIGN CLR
A	0.370	0.375	0.005	.004/.006
B	1.872	1.931	0.059	.057/.069
C	1.181	1.188	0.007	.010/.012
D	1.925	1.935	0.010	.010/.013
E	0.474	0.494	0.020	.012/.018

PILOT SPRING COMPRESSION =	0.390
PILOT INTERNAL TRAVEL =	0.180

Parts Replaced on Valve #4

Stem, Stem End, Spring, Spring Seat,
Pilot Valve Retaining Nut,
Main Valve Disk, 4 Screws to flex plate

FILE: TV009.PPT Rev. 01

Tool # Used ____________________ Cal. Due Date __________

As Found __________ Reading Taken By: ______RAHN / Burnheimers_________ Date: _9/29/01___

As Assembled ____X______ Reviewed By (W) Eng.: ____________________ Date: __________

SIEMENS
WESTINGHOUSE

CUSTOMER: AEP
LOCATION/UNIT #: MITCHELL 1

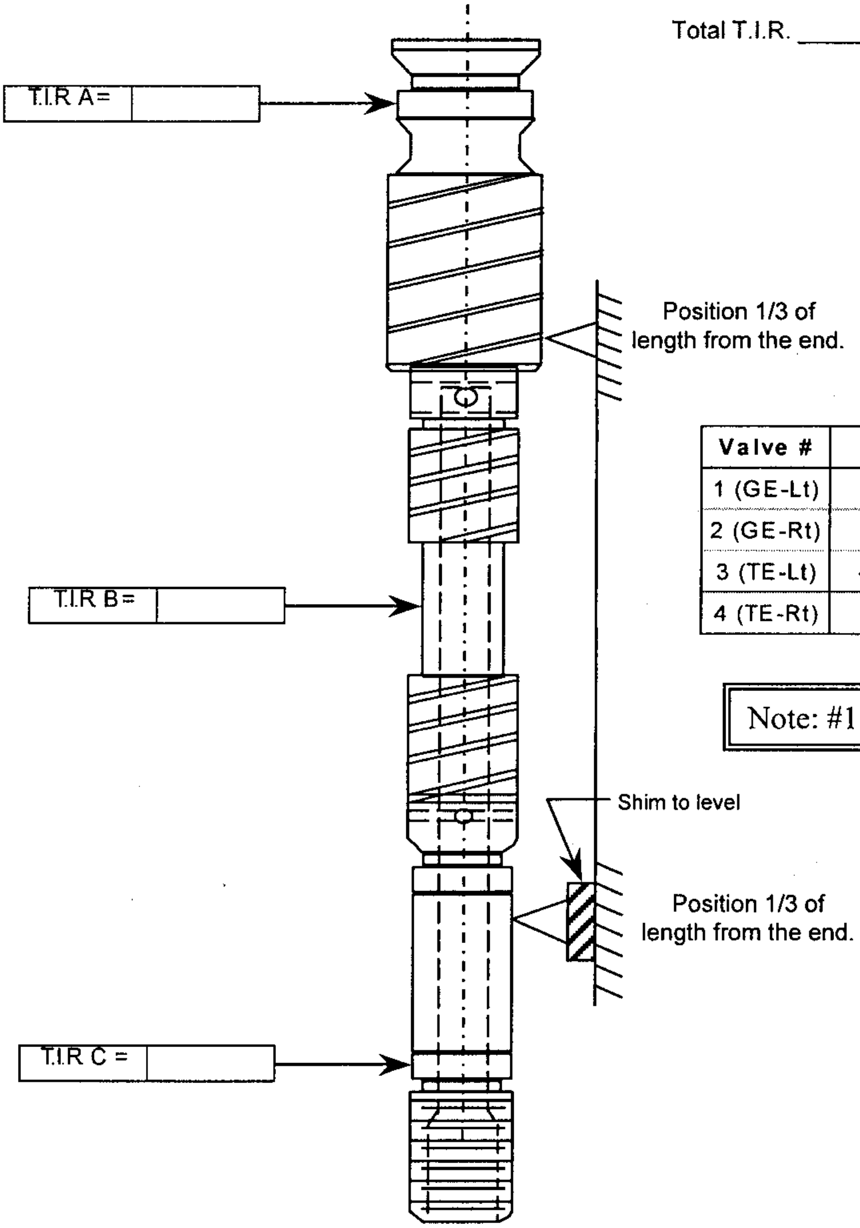
THROTTLE VALVE STEM RUNOUT

BB/FRAME: JOB NO.:
COMPONENT/S.O.: DWG.:

Valve Test # ___________

Total T.I.R. Equals B Plus the Largest of A or C.

Total T.I.R. ___________



Valve #	A	B	C
1 (GE-Lt)	0.001	0.002	0.001
2 (GE-Rt)	0.002	0.002	0.001
3 (TE-Lt)	-0.003	-0.003	-0.002
4 (TE-Rt)	0.001	0.001	0.001

Note: #1, 2, 4 are new stems

Tool # Used ______________________________ Cal. Due Date __________

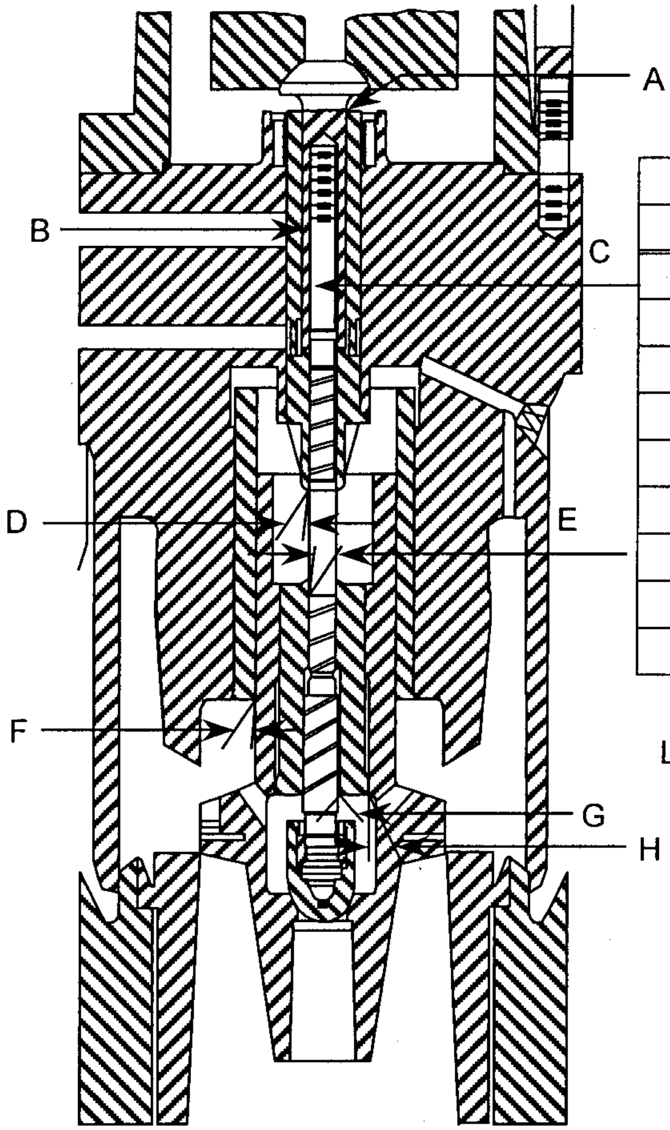
As Found __________ Reading Taken By: ______J Brothers__________________ Date: _9/24/01____

As Assembled ____X______ Reviewed By (W) Eng.: ______________________________ Date: __________

FILE: TV016.PPT Rev. 01

SIEMENS
WESTINGHOUSE

CUSTOMER: AEP	
LOCATION/UNIT #: MITCHELL 1	
THROTTLE VALVE	
BB/FRAME:	JOB NO.:
COMPONENT/S.O.:	DWG.:



THROTTLE VALVE CLEARANCES

DIA	O.D.	I.D.	ACTUAL	DESIGN
A	2.112	2.124	0.012	.010/.013
B	2.112	2.125	0.013	.010/.013
C	1.381	1.393	0.012	.005/.007
D	1.486	1.500	0.014	.010/.013
E	1.486	1.498	0.012	.010/.013
F	5.486	5.490/5.495	.004/.009	.011/.017
G	1.929	1.935	0.006	.010/.013
H	3.806	3.809/3.812	.003/.006	.002/.005
I = RUNOUT = TIR .012				0/.003

LOCATION _____#1 Gen end LS_________

FILE: TV013.PPT Rev. 00

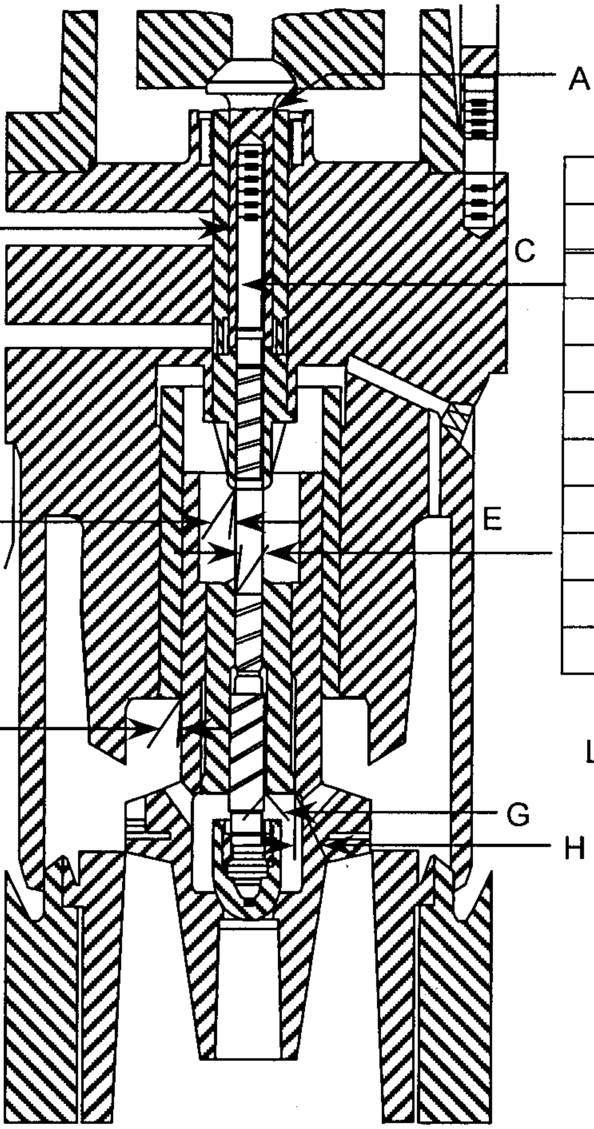
Tool # Used ______________________________ Cal. Due Date __________

As Found ____X______ Reading Taken By: _______G. Rahn___________________ Date: __9/18/01___

As Assembled __________ Reviewed By (W) Eng.: ______________________________ Date: __________

**SIEMENS
WESTINGHOUSE**

CUSTOMER: AEP	
LOCATION/UNIT #: MITCHELL 1	
THROTTLE VALVE	
BB/FRAME:	JOB NO.:
COMPONENT/S.O.:	DWG.:



THROTTLE VALVE CLEARANCES				
DIA	O.D.	I.D.	ACTUAL	DESIGN
A	2.110	2.125	0.015	.010/.013
B	2.11	2.125	0.015	.010/.013
C	1.381	1.392	0.011	.005/.007
D	1.488	1.501	0.013	.010/.013
E	1.488	1.497	0.009	.010/.013
F	5.48	5.489	0.009	.011/.017
G	1.931	1.935	0.004	.010/.013
H	3.804	3.809	0.005	.002/.005
I = RUNOUT = TIR .011				0/.003

LOCATION #2 Gen end RS

FILE: TV013.PPT Rev. 00

Tool # Used

Cal. Due Date

As Found X

Reading Taken By: G. Rahn

Date: 9/18/01

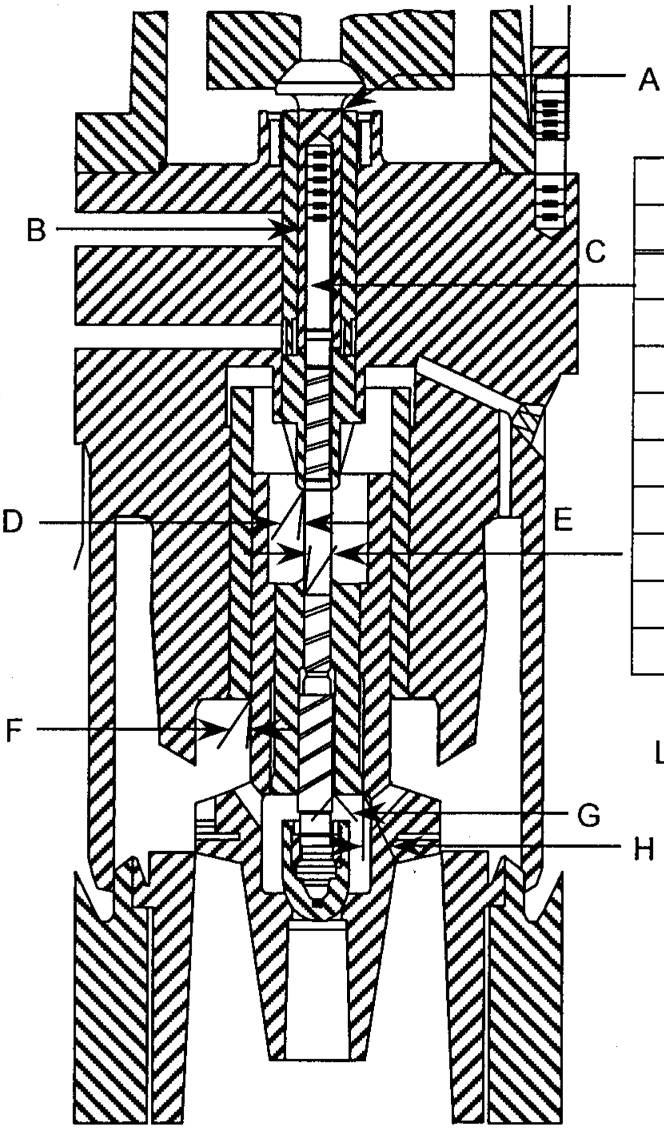
As Assembled

Reviewed By (W) Eng.:

Date:

SIEMENS
WESTINGHOUSE

CUSTOMER: AEP	
LOCATION/UNIT #: MITCHELL 1	
THROTTLE VALVE	
BB/FRAME:	JOB NO.:
COMPONENT/S.O.:	DWG.:



THROTTLE VALVE CLEARANCES				
DIA	O.D.	I.D.	ACTUAL	DESIGN
A	2.114	2.125	0.011	.010/.013
B	2.115	2.124	0.009	.010/.013
C	1.380	1.388	0.008	.005/.007
D	1.486	1.499	0.013	.010/.013
E	1.487	1.498	0.011	.010/.013
F	5.485	5.491	0.006	.011/.017
G	1.927	1.935	0.008	.010/.013
H	3.807	3.807/3.811	0/.004	.002/.005
I = RUNOUT = TIR .008				0/.003

LOCATION _____#3 Gov end LS_________

FILE: TV013.PPT Rev. 00

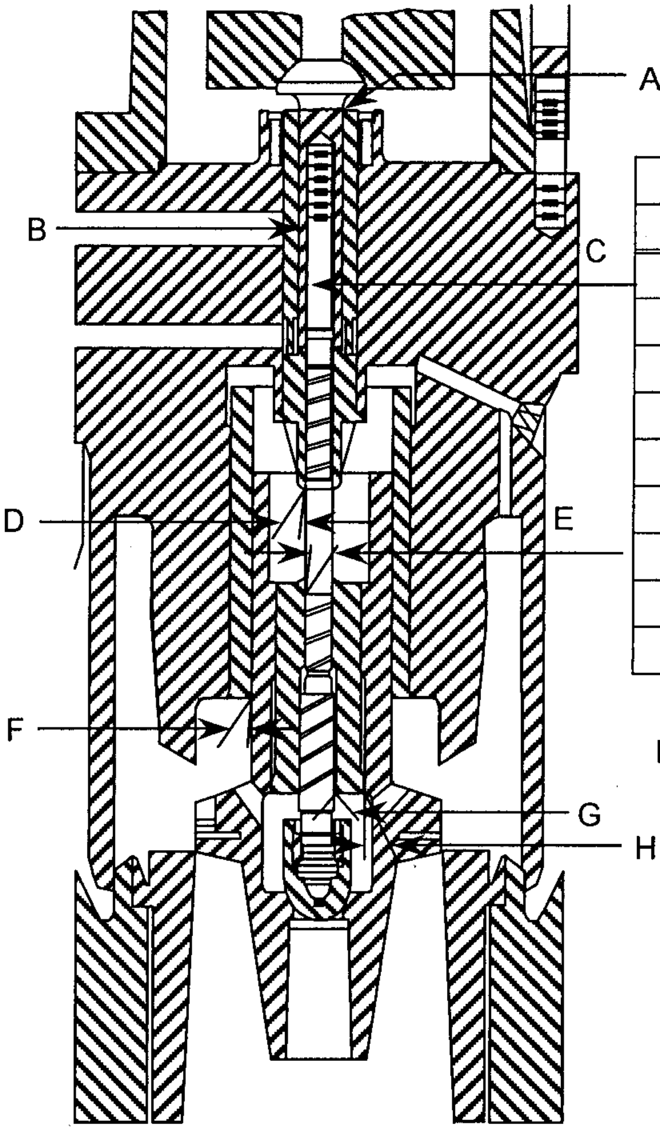
Tool # Used ______________________________ Cal. Due Date __________

As Found ____X______ Reading Taken By: _______G. Rahn___________________ Date: __9/18/01___

As Assembled __________ Reviewed By (W) Eng.: ______________________________ Date: __________

SIEMENS
WESTINGHOUSE

CUSTOMER: AEP	
LOCATION/UNIT #: MITCHELL 1	
THROTTLE VALVE	
BB/FRAME:	JOB NO.:
COMPONENT/S.O.:	DWG.:



THROTTLE VALVE CLEARANCES				
DIA	O.D.	I.D.	ACTUAL	DESIGN
A	2.110	2.125	0.015	.010/.013
B	2.112	2.125	0.013	.010/.013
C	1.383	1.393	0.010	.005/.007
D	1.490	1.500	0.010	.010/.013
E	1.489	1.498	0.009	.010/.013
F	5.482	5.489	0.007	.011/.017
G	1.932	1.935	0.003	.010/.013
H	3.807	3.812	0.005	.002/.005
I = RUNOUT = TIR .021				0/.003

LOCATION _____#4 Gov end RS_________

FILE: TV013.PPT Rev. 00

Tool # Used ____________________________ Cal. Due Date __________

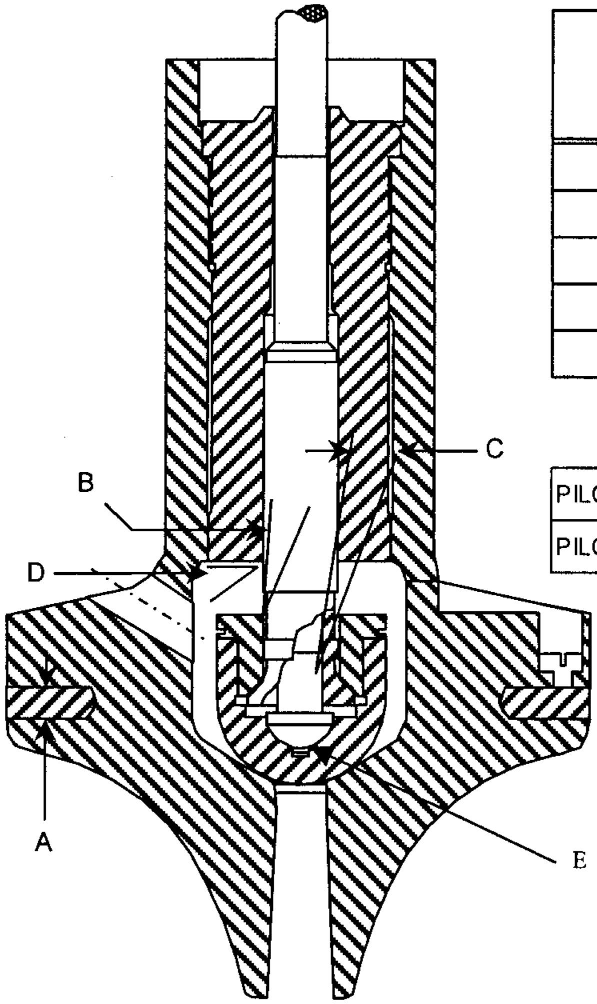
As Found ____X______ Reading Taken By: _______G. Rahn___________________ Date: __9/18/01___

As Assembled __________ Reviewed By (W) Eng.: ____________________________ Date: __________

SIEMENS
WESTINGHOUSE

CUSTOMER: AEP	
LOCATION/UNIT #: MITCHELL 1	
THROTTLE VALVE	
BB/FRAME:	JOB NO.:
COMPONENT/S.O.:	DWG.:

Valve #1 Gen End LS



DIM	O.D.	I.D.	ACTUAL CLR	DESIGN CLR
A				.004/.006
B	1.862/1.877	1.835/1.845	.017/.042	.057/.069
C	1.185	1.187/1.194	.002/.009	.010/.012
D	1.929	1.936	0.007	.010/.013
E	**0.51	0.52		.012/.018

** Mushroom, bad reading

PILOT SPRING COMPRESSION =	
PILOT INTERNAL TRAVEL =	

FILE: TV009.PPT Rev. 01

Tool # Used ______________________________ Cal. Due Date __________

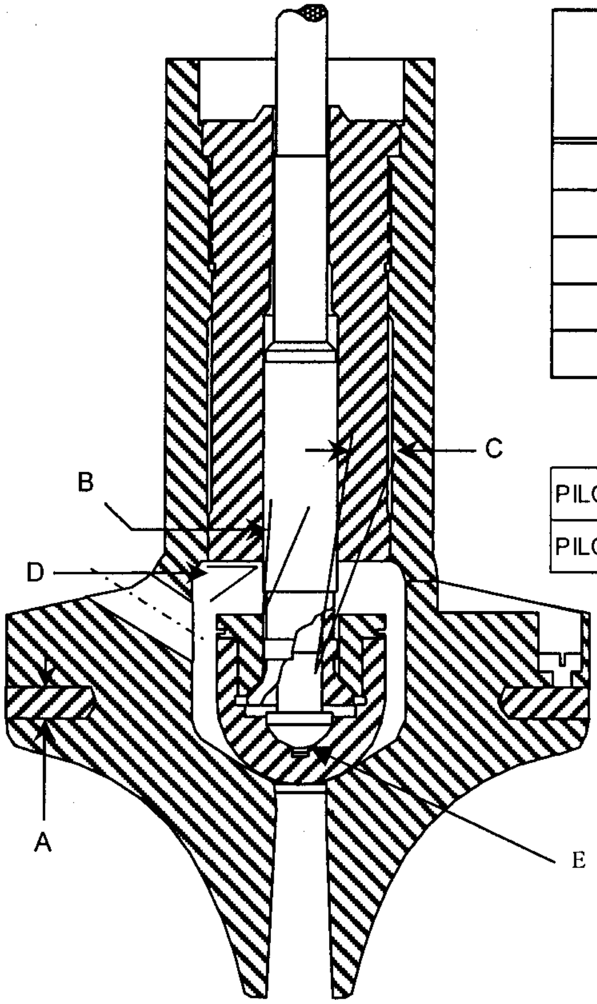
As Found ____X______ Reading Taken By: ______RAHN____________________ Date: _9/19/01___

As Assembled __________ Reviewed By (W) Eng.: ______________________________ Date: __________

SIEMENS
WESTINGHOUSE

CUSTOMER: AEP	
LOCATION/UNIT #: MITCHELL 1	
THROTTLE VALVE	
BB/FRAME:	JOB NO.:
COMPONENT/S.O.:	DWG.:

Valve #2 Gen End RS



DIM	O.D.	I.D.	ACTUAL CLR	DESIGN CLR
A				.004/.006
B	1.878	1.936	0.058	.057/.069
C	1.178	1.187	0.009	.010/.012
D	1.928	1.935	0.007	.010/.013
E	0.492	0.504	0.012	.012/.018

PILOT SPRING COMPRESSION =	
PILOT INTERNAL TRAVEL =	

FILE: TV009.PPT Rev. 01

Tool # Used ______________ Cal. Due Date __________

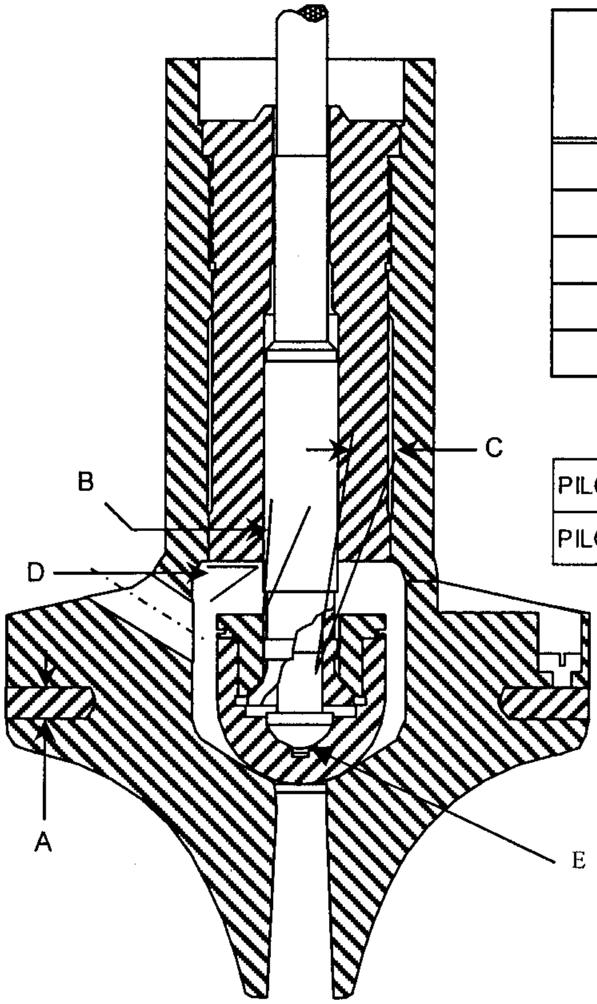
As Found ____X______ Reading Taken By: ______RAHN__________________ Date: _9/19/01___

As Assembled __________ Reviewed By (W) Eng.: ______________________ Date: __________

SIEMENS
WESTINGHOUSE

CUSTOMER: AEP	
LOCATION/UNIT #: MITCHELL 1	
THROTTLE VALVE	
BB/FRAME:	JOB NO.:
COMPONENT/S.O.:	DWG.:

Valve #3 Gov End LS



DIM	O.D.	I.D.	ACTUAL CLR	DESIGN CLR
A	0.368	.370/.388	.002/.020	.004/.006
B	1.866/1.877	1.947	.081/.070	.057/.069
C	1.170/1.180	1.18	.010/.000	.010/.012
D	1.927	1.935	0.008	.010/.013
E	0.48	0.516	0.036	.012/.018

PILOT SPRING COMPRESSION =	
PILOT INTERNAL TRAVEL =	

FILE: TV009.PPT Rev. 01

Tool # Used ______________ Cal. Due Date __________

As Found ____X______ Reading Taken By: ______RAHN__________________ Date: _9/19/01___

As Assembled __________ Reviewed By (W) Eng.: ______________________ Date: __________

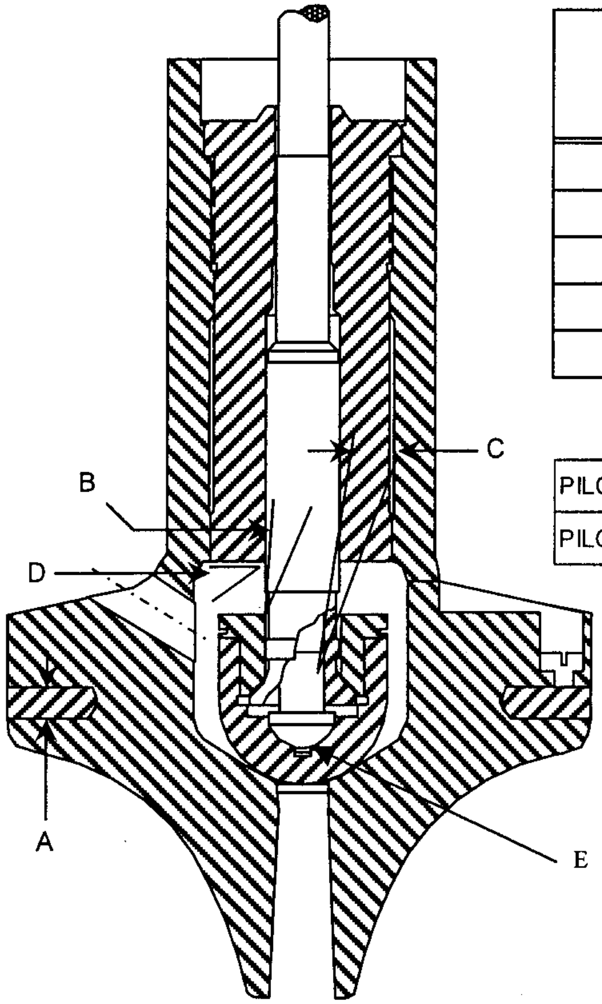
SIEMENS
WESTINGHOUSE

CUSTOMER: AEP
LOCATION/UNIT #: MITCHELL 1

THROTTLE VALVE

BB/FRAME: JOB NO.:
COMPONENT/S.O.: DWG.:

Valve #4 Gov End RS



DIM	O.D.	I.D.	ACTUAL CLR	DESIGN CLR
A	0.372	.372/.392	.000/.020	.004/.006
B	1.863/1.880	1.940	.077/.060	.057/.069
C	1.178	1.187	0.016	.010/.012
D	1.93	1.935	0.005	.010/.013
E	0.494	0.535	0.041	.012/.018

PILOT SPRING COMPRESSION =	
PILOT INTERNAL TRAVEL =	

FILE: TV009.PPT Rev. 01

Tool # Used ______ Cal. Due Date ______

As Found ____X______ Reading Taken By: ______RAHN______ Date: _9/19/01___

As Assembled ______ Reviewed By (W) Eng.: ______ Date: ______

SIEMENS
WESTINGHOUSE

CUSTOMER: AEP

LOCATION/UNIT #: MITCHELL 1

THROTTLE VALVE STEM RUNOUT

BB/FRAME:

JOB NO.:

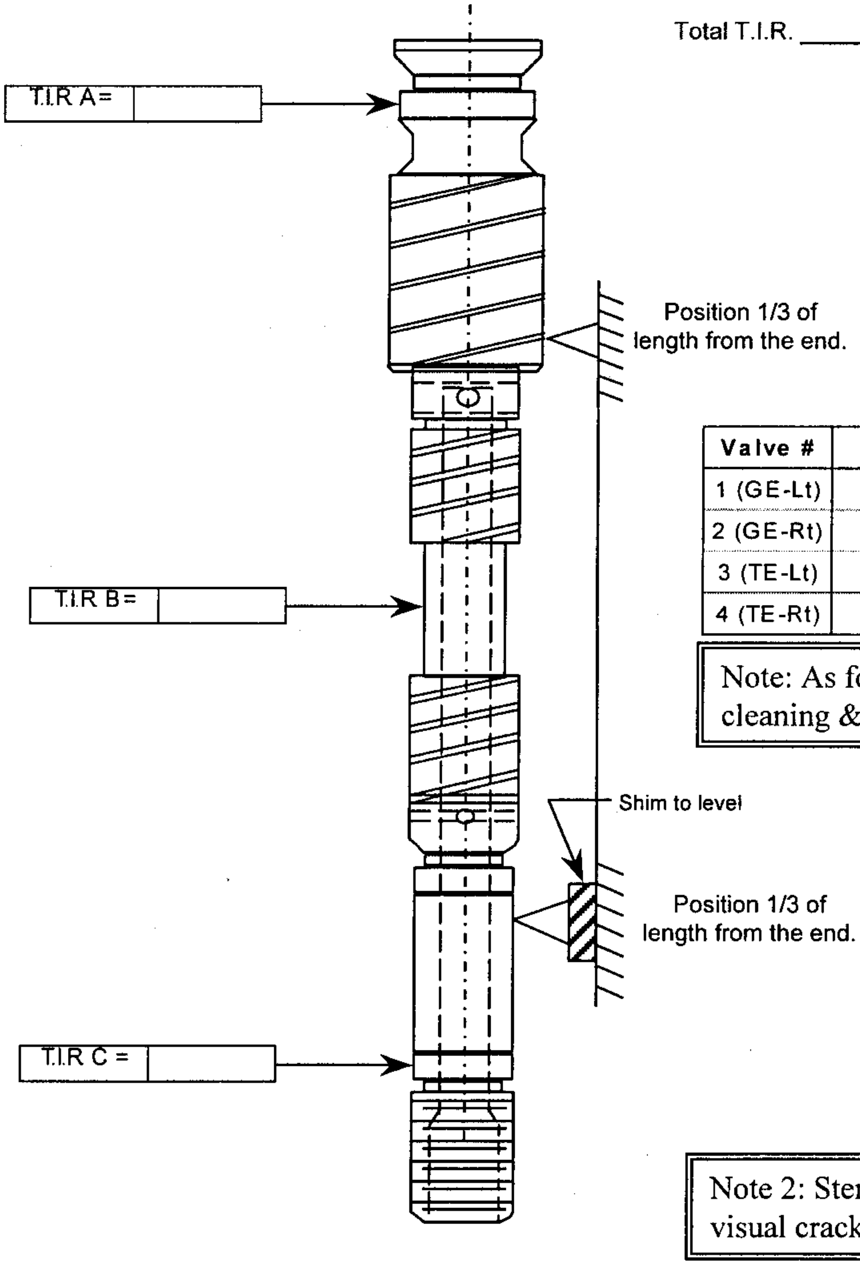
COMPONENT/S.O.:

DWG.:

Valve Test # __________

Total T.I.R. Equals B Plus the Largest of A or C.

Total T.I.R. __________



Valve #	A	B	C
1 (GE-Lt)	-0.003	-0.006	0.002
2 (GE-Rt)	-0.003	-0.008	0.008
3 (TE-Lt)	-0.003	-0.003	-0.002
4 (TE-Rt)	-0.002	-0.010	0.003

Note: As found data after cleaning & polishing the stems.

Note 2: Stem for valve #2 has a visual crack in it.

Tool # Used ______________________________

Cal. Due Date __________

As Found ___X_______

Reading Taken By: ______J. Brothers __________________

Date: _9/20/01____

As Assembled __________

Reviewed By (W) Eng.: ______________________________

Date: __________

SIEMENS
WESTINGHOUSE

CUSTOMER: AEP
LOCATION/UNIT #: MITCHELL 1

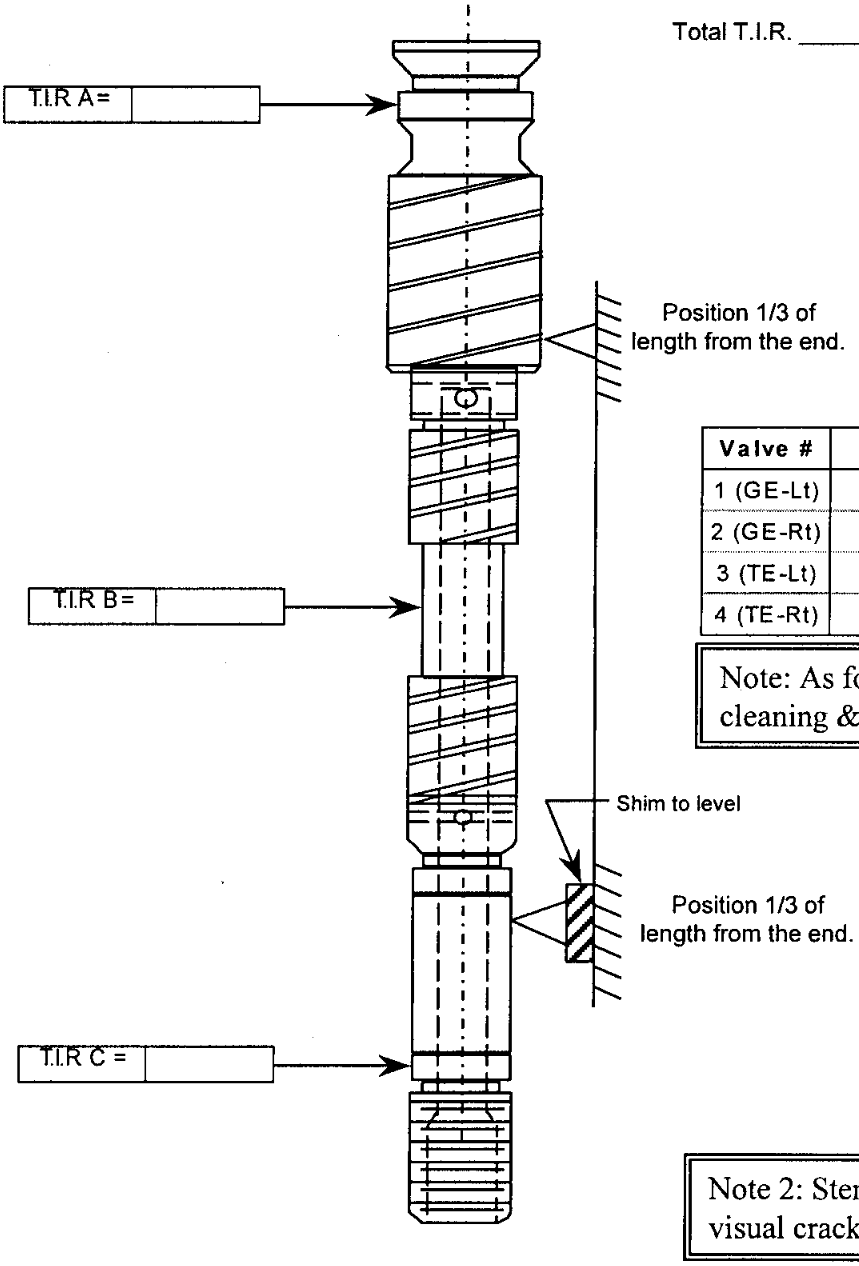
THROTTLE VALVE STEM RUNOUT

BB/FRAME: JOB NO.:
COMPONENT/S.O.: DWG.:

Valve Test # __________

Total T.I.R. Equals B Plus the Largest of A or C.

Total T.I.R. __________



Valve #	A	B	C
1 (GE-Lt)	0.012	0.002	0.002
2 (GE-Rt)	0.011	0.007	0.002
3 (TE-Lt)	0.008	0.002	0.003
4 (TE-Rt)	0.021	0.012	0.003

Note: As found data prior to cleaning & polishing the stems.

Note 2: Stem for valve #2 has a visual crack in it.

Tool # Used ______________________________ Cal. Due Date __________

As Found ___X_______ Reading Taken By: ______G. Rahn __________________ Date: _9/19/01____

As Assembled __________ Reviewed By (W) Eng.: ______________________________ Date: __________

FILE: TV016.PPT Rev. 01

SIEMENS
Westinghouse

CUSTOMER: AEP
LOCATION/UNIT #: MITCHELL #1

THROTTLE VALVE BOLT STRETCH CHART

BB/FRAME: JOB NO.:
COMPONENT/S.O.: Throttle valve DWG.:

Pre-torque 500 ft-lb **#4 THROTTLE VALVE**

BOLT NO.	DIA.	FREE LENGHT	REQ'D STRETCH	COLD MIC. MEAS.	COLD PULL MIC. READING	FLATS TO TURN NUT	HOT STRETCH	TOTAL STRTCH	FLATS TO CORRECT	FINAL MEAS.	FINCH STRETCH
1	2 1/2	14.50	0.021	0.769						0.749	0.02
2	2 1/2	14.50	0.021	0.551						0.53	0.021
3	2 1/2	14.50	0.021	0.764						0.744	0.02
4	2 1/2	14.50	0.021	0.781						0.762	0.019
5	2 1/2	14.50	0.021	0.78						0.76	0.02
6	2 1/2	14.50	0.021	0.712						0.691	0.021
7	2 1/2	14.50	0.021	0.744						0.721	0.023
8	2 1/2	14.50	0.021	0.719						0.699	0.02
9	2 1/2	14.50	0.021	0.879						0.869	0.01
10	2 1/2	14.50	0.021	0.863						0.842	0.021
11	2 1/2	14.50	0.021	0.836						0.816	0.02
12	2 1/2	14.50	0.021	0.751						0.731	0.02
13	2 1/2	14.50	0.021	0.815						0.795	0.02
14	2 1/2	14.50	0.021	0.752						0.733	0.019
15	2 1/2	14.50	0.021	0.729						0.71	0.019
16	2 1/2	14.50	0.021	0.86						0.838	0.022
17	2 1/2	14.50	0.021	0.8						0.779	0.021
18	2 1/2	14.50	0.021	0.653						0.632	0.021

Tool # Used ____________________ Cal. Due Date __________

As Found __________ Reading Taken By: ______________ Date: _10/18/01_______

As Assembled ___X_______ Reviewed By (W) Eng.: ______ Date: ____

SIEMENS
Westinghouse

CUSTOMER: AEP
LOCATION/UNIT #: MITCHELL #1

THROTTLE VALVE BOLT STRETCH CHART

BB/FRAME: JOB NO.:
COMPONENT/S.O.: Throttle valve DWG.:

Pre-torque 500 ft-lb **#3 THROTTLE VALVE**

BOLT NO.	DIA.	FREE LENGHT	REQ'D STRETCH	COLD MIC. MEAS.	COLD PULL MIC. READING	FLATS TO TURN NUT	HOT STRETCH	TOTAL STRTCH	FLATS TO CORRECT	FINAL MEAS.	FINCH STRETCH
1	2 1/2	14.50	0.021	0.698						0.676	0.022
2	2 1/2	14.50	0.021	0.971						0.751	0.22
3	2 1/2	14.50	0.021	0.756						0.734	0.022
4	2 1/2	14.50	0.021	0.822						0.802	0.02
5	2 1/2	14.50	0.021	0.745						0.724	0.021
6	2 1/2	14.50	0.021	0.751						0.731	0.02
7	2 1/2	14.50	0.021	0.846						0.824	0.022
8	2 1/2	14.50	0.021	0.752						0.731	0.021
9	2 1/2	14.50	0.021	0.743						0.721	0.022
10	2 1/2	14.50	0.021	0.791						0.77	0.021
11	2 1/2	14.50	0.021	0.743						0.721	0.022
12	2 1/2	14.50	0.021	0.811						0.789	0.022
13	2 1/2	14.50	0.021	0.884						0.864	0.02
14	2 1/2	14.50	0.021	0.849						0.829	0.02
15	2 1/2	14.50	0.021	0.74						0.719	0.021
16	2 1/2	14.50	0.021	0.771						0.75	0.021
17	2 1/2	14.50	0.021	0.712						0.692	0.02
18	2 1/2	14.50	0.021	0.718						0.698	0.02

Tool # Used ____________________ Cal. Due Date __________

As Found __________ Reading Taken By: ______________ Date: _10/18/01_______

As Assembled ___X_______ Reviewed By (W) Eng.: ______ Date: ____

FILE: F4 'T Rev. 00

SIEMENS
Westinghouse

CUSTOMER: AEP
LOCATION/UNIT #: MITCHELL #1

THROTTLE VALVE BOLT STRETCH CHART

BB/FRAME: JOB NO.:
COMPONENT/S.O.: Throttle valve DWG.:

Pre-torque 500 ft-lb **#2 THROTTLE VALVE**

BOLT NO.	DIA.	FREE LENGHT	REQ'D STRETCH	COLD MIC. MEAS.	COLD PULL MIC. READING	FLATS TO TURN NUT	HOT STRETCH	TOTAL STRTCH	FLATS TO CORRECT	FINAL MEAS.	FINCH STRETCH
1	2 1/2	14.50	0.021	0.715	0.71					0.695	0.02
2	2 1/2	14.50	0.021	0.799	0.791					0.779	0.02
3	2 1/2	14.50	0.021	0.777	0.769					0.756	0.021
4	2 1/2	14.50	0.021	0.742	0.734					0.719	0.023
5	2 1/2	14.50	0.021	0.741	0.732					0.721	0.02
6	2 1/2	14.50	0.021	0.673	0.666					0.653	0.02
7	2 1/2	14.50	0.021	0.766	0.781					0.745	0.021
8	2 1/2	14.50	0.021	0.779	0.772					0.757	0.022
9	2 1/2	14.50	0.021	0.725	0.718					0.705	0.02
10	2 1/2	14.50	0.021	0.722	0.715					0.701	0.021
11	2 1/2	14.50	0.021	0.873	0.864					0.852	0.021
12	2 1/2	14.50	0.021	0.838	0.83					0.818	0.02
13	2 1/2	14.50	0.021	0.807	0.798					0.786	0.021
14	2 1/2	14.50	0.021	0.863	0.852					0.843	0.02
15	2 1/2	14.50	0.021	0.818	0.807					0.797	0.021
16	2 1/2	14.50	0.021	0.738	0.734					0.717	0.021
17	2 1/2	14.50	0.021	0.767	0.761					0.747	0.02
18	2 1/2	14.50	0.021	0.873	0.866					0.853	0.02

Tool # Used ______________________________ Cal. Due Date __________

As Found __________ Reading Taken By: _______________ Date: _10/18/01_______

As Assembled ___X_______ Reviewed By (W) Eng.: ______ Date: ____

FILE: F4 T Rev. 00

SIEMENS
Westinghouse

CUSTOMER: AEP
LOCATION/UNIT #: MITCHELL #1

THROTTLE VALVE BOLT STRETCH CHART

BB/FRAME: JOB NO.:
COMPONENT/S.O.: Throttle valve DWG.:

Pre-torque 500 ft-lb **#1 THROTTLE VALVE**

BOLT NO.	DIA.	FREE LENGHT	REQ'D STRETCH	COLD MIC. MEAS.	COLD PULL MIC. READING	FLATS TO TURN NUT	HOT STRETCH	TOTAL STRTCH	FLATS TO CORRECT	FINAL MEAS.	FINCH STRETCH
1	2 1/2	14.50	0.021	0.861	0.841						0.02
2	2 1/2	14.50	0.021	0.808	0.786						0.022
3	2 1/2	14.50	0.021	0.812	0.789						0.023
4	2 1/2	14.50	0.021	0.699	0.678						0.021
5	2 1/2	14.50	0.021	0.786	0.771					0.765	0.021
6	2 1/2	14.50	0.021	0.742	0.731					0.722	0.02
7	2 1/2	14.50	0.021	0.781	0.76						0.021
8	2 1/2	14.50	0.021	0.85	0.836	1/2				0.83	0.02
9	2 1/2	14.50	0.021	0.72	0.698						0.022
10	2 1/2	14.50	0.021	0.808	0.797	2/3				0.785	0.023
11	2 1/2	14.50	0.021	0.863	0.843						0.02
12	2 1/2	14.50	0.021	0.788	0.767						0.021
13	2 1/2	14.50	0.021	0.828	0.815	1/2				0.808	0.02
14	2 1/2	14.50	0.021	0.853	0.836	1/3				0.83	0.023
15	2 1/2	14.50	0.021	0.846	0.832	1/2				0.825	0.021
16	2 1/2	14.50	0.021	0.756	0.736						0.02
17	2 1/2	14.50	0.021	0.785	0.765						0.02
18	2 1/2	14.50	0.021	0.742	0.722						0.02

Tool # Used ______________________________ Cal. Due Date __________

As Found __________ Reading Taken By: _______________ Date: _10/18/01_______

As Assembled ___X_______ Reviewed By (W) Eng.: ______ Date: ____

FILE: F4 T Rev. 00

Interceptor Valves

The first reheat intercept valves (2) and second reheat intercept valves (4) for unit 1 were disassembled and inspected by RSO personnel under job order 3349032-03.

The intercept valve spring cans were unpinned and removed. The bonnet was unbolted and the valve assembly was removed. The IV strainers were removed.

The crossheads were unscrewed from the stems and the stem / disk assemblies were removed from the bonnets. In disassembling the stems from the disks, the retaining nuts had to be destroyed. Since there were only four retaining nuts in stock, and lead time for these nuts was six weeks, the stems for two of the intercept valves were NOT removed from the disks. The two stems that were not removed from the disks were the TE left side and TE right side second reheat intercept valves.

All valve components were blast cleaned by Federal Industrial and NDE inspections were performed by CMS personnel. The valve casing internals were blast cleaned and NDE inspected with no cracking noted. The valve strainers were blast cleaned and visually inspected.

As found readings were taken on the intercept valve stems and bushings. Runout readings were taken on the stems before and after polishing. For the two stems that were not removed from the disks, runouts were taken by laying the disks on their sides and rotating the stems inside of them.

All of the IV stems had excessive runout. Two spares were in stock and were used to replace both first reheat intercept valves. No spare stems were available for the second reheat intercept valves. Siemens-Westinghouse and other vendors were called and the shortest lead time for new shafts was 9 weeks. Since cold straightening the shafts carries the risk of cracking the shafts, it was decided to reuse the shafts as found and replace them during the next outage.

The bushings were honed to provide proper clearance to the IV stems. The valve pressure seal rings were all cleaned up and miced for clearance. The stem back seats were checked for contact and lapped until 100% contact was achieved. The backseat for the two valves that were not removed from their disks were lapped and checked to the new stems.

The stems were reassembled to the disks and the pre-travel was set. The stem locking nuts were torqued and pinned. The valve stems were reinstalled in the bonnets and the crossheads were torqued and pinned. All of the strainers and bonnets were installed in their casings. The bonnet bolts were torqued using the Plarad torque wrench.

The intercept valve spring cans were installed. The valves were stroked by ICT personnel.

All data taken is included with this report. During the next outage, spare stems and retaining nuts need to be available for all of the 2nd reheat intercept valves.

SIEMENS
WESTINGHOUSE

CUSTOMER: AEP
LOCATION/UNIT #: MITCHELL 1

INTERCEPTOR VALVE DIMENSIONS

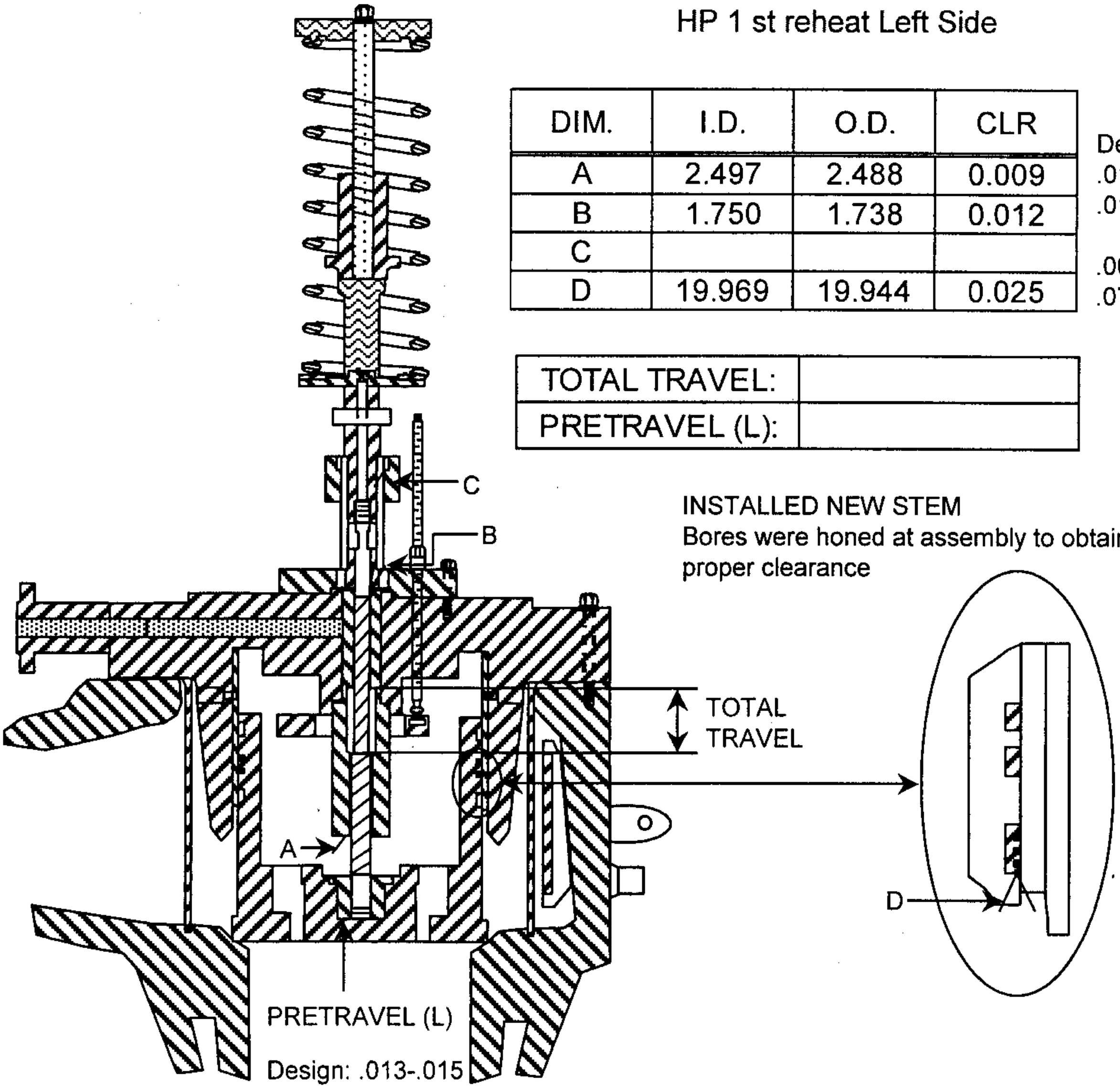
BB/FRAME: JOB NO.:
COMPONENT/S.O.: DWG.:

HP 1 st reheat Left Side

DIM.	I.D.	O.D.	CLR	Design
A	2.497	2.488	0.009	.013-.016
B	1.750	1.738	0.012	.013 -.016
C				.001-.004
D	19.969	19.944	0.025	.070-.074

TOTAL TRAVEL:	
PRETRAVEL (L):	

INSTALLED NEW STEM
Bores were honed at assembly to obtain proper clearance



FILE: IV006.PPT Rev.00

Tool # Used ____________ Cal. Due Date ________

As Found ________ Reading Taken By: RAHN Date: 9/25/01

As Assembled X Reviewed By (W) Eng.: ____________ Date: ________

SIEMENS
WESTINGHOUSE

CUSTOMER: AEP
LOCATION/UNIT #: MITCHELL 1

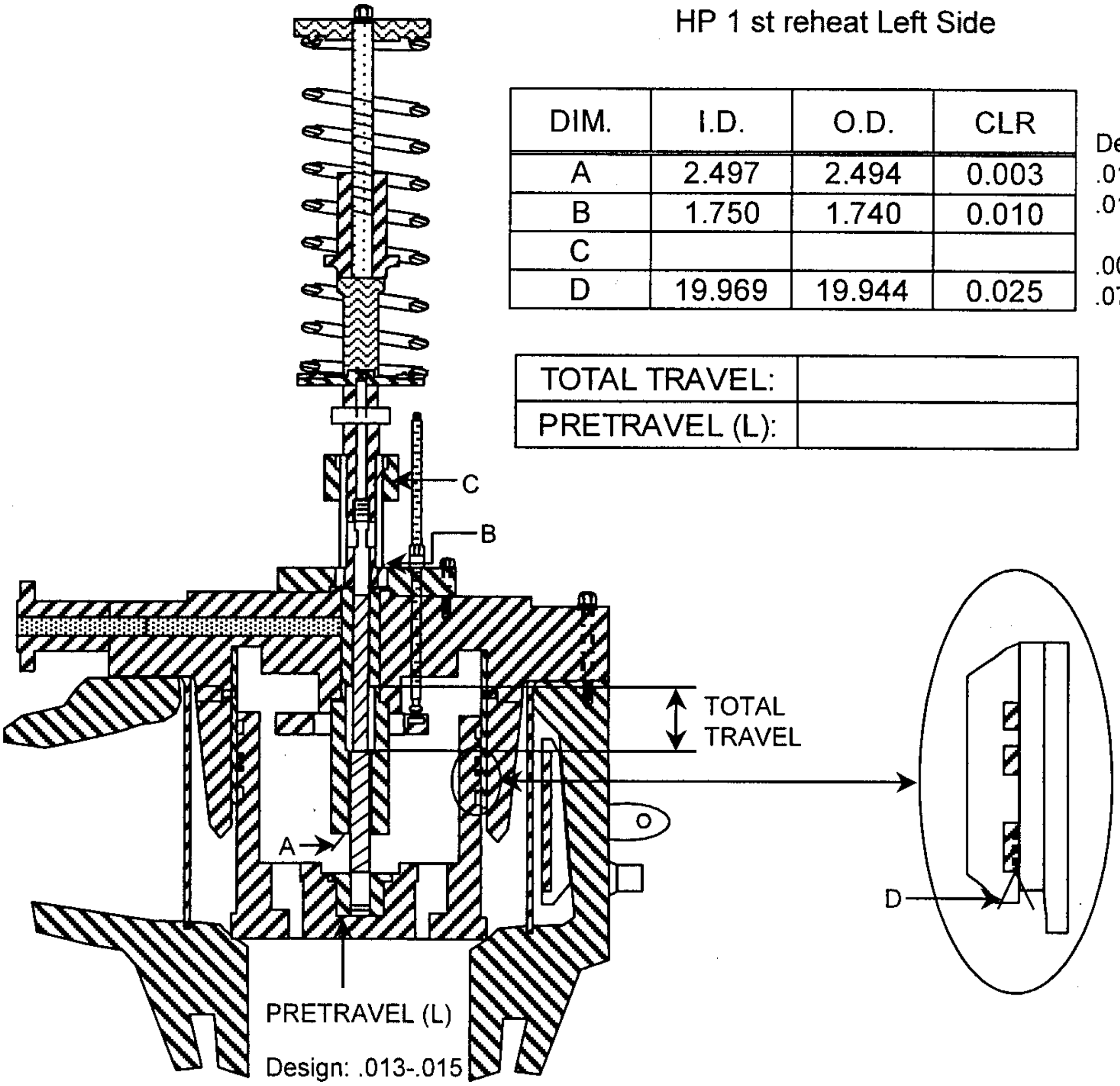
INTERCEPTOR VALVE DIMENSIONS

BB/FRAME: JOB NO.:
COMPONENT/S.O.: DWG.:

HP 1 st reheat Left Side

DIM.	I.D.	O.D.	CLR	Design
A	2.497	2.494	0.003	.013-.016
B	1.750	1.740	0.010	.013 -.016
C				.001-.004
D	19.969	19.944	0.025	.070-.074

TOTAL TRAVEL:	
PRETRAVEL (L):	



FILE: IV006.PPT Rev.00

Tool # Used ______________ Cal. Due Date ________

As Found ____X______ Reading Taken By: ___Day & Night________ Date: _9/24/01___

As Assembled _________ Reviewed By (W) Eng.: ______________ Date: ________

SIEMENS
WESTINGHOUSE

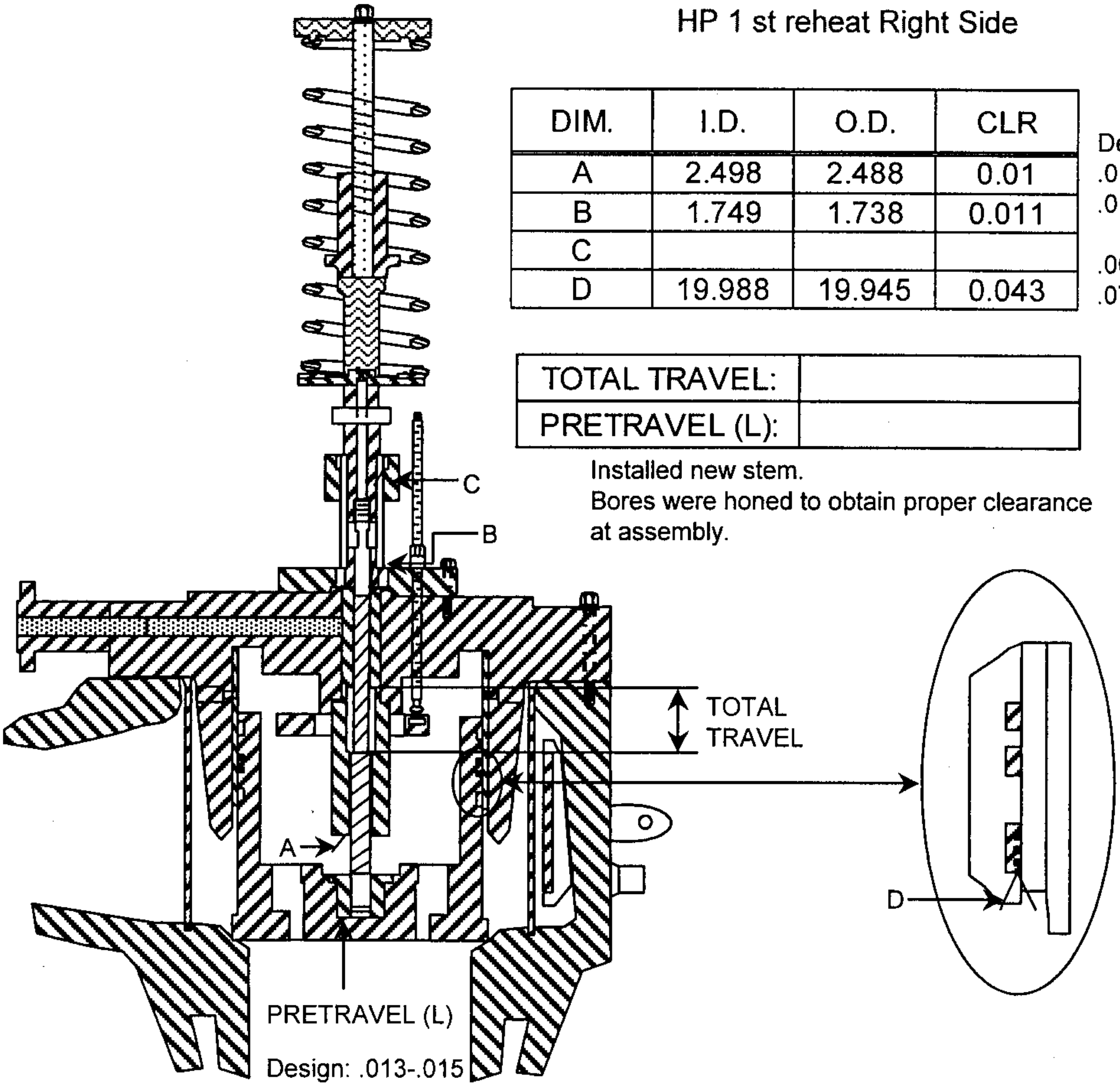
CUSTOMER: AEP	
LOCATION/UNIT #: MITCHELL 1	
INTERCEPTOR VALVE DIMENSIONS	
BB/FRAME:	JOB NO.:
COMPONENT/S.O.:	DWG.:

HP 1 st reheat Right Side

DIM.	I.D.	O.D.	CLR	Design
A	2.498	2.488	0.01	.013-.016
B	1.749	1.738	0.011	.013 -.016
C				.001-.004
D	19.988	19.945	0.043	.070-.074

TOTAL TRAVEL:	
PRETRAVEL (L):	

Installed new stem.
Bores were honed to obtain proper clearance at assembly.



FILE: IV006.PPT Rev.00

Tool # Used ____________ Cal. Due Date ________

As Found ________ Reading Taken By: ___RAHN__________ Date: _9/25/01___

As Assembled ____X______ Reviewed By (W) Eng.: ____________ Date: ________

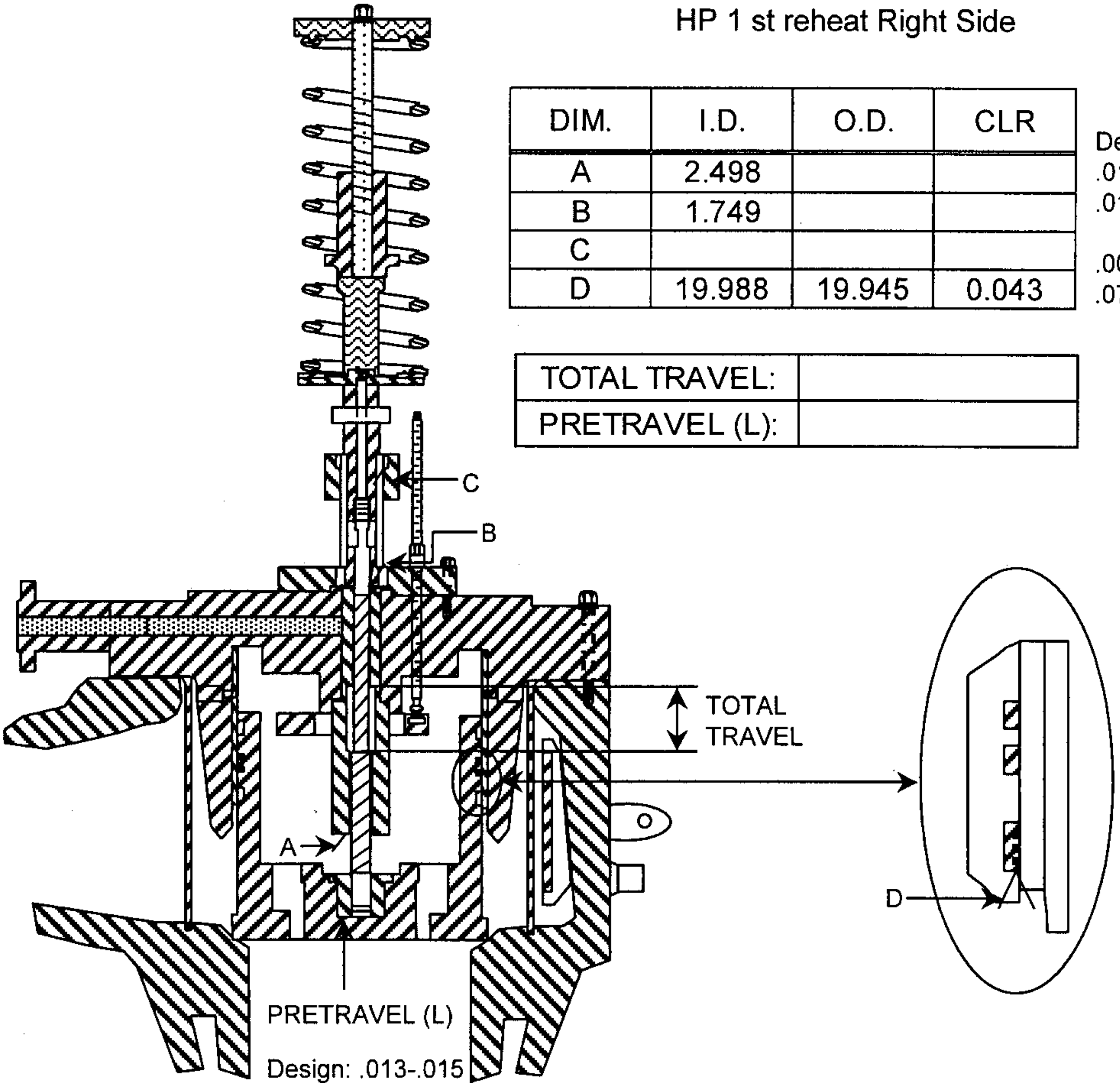
SIEMENS
WESTINGHOUSE

CUSTOMER:	AEP	
LOCATION/UNIT #:	MITCHELL 1	
INTERCEPTOR VALVE DIMENSIONS		
BB/FRAME:		JOB NO.:
COMPONENT/S.O.:		DWG.:

HP 1 st reheat Right Side

DIM.	I.D.	O.D.	CLR	Design
A	2.498			.013-.016
B	1.749			.013 -.016
C				.001-.004
D	19.988	19.945	0.043	.070-.074

TOTAL TRAVEL:	
PRETRAVEL (L):	



Design: .013-.015

FILE: IV006.PPT Rev.00

Tool # Used ______________________ Cal. Due Date __________

As Found ____X______ Reading Taken By: ___Day & Night________________ Date: _9/24/01___

As Assembled __________ Reviewed By (W) Eng.: ______________________ Date: __________

SIEMENS
WESTINGHOUSE

CUSTOMER: AEP
LOCATION/UNIT #: MITCHELL 1

INTERCEPTOR VALVE DIMENSIONS

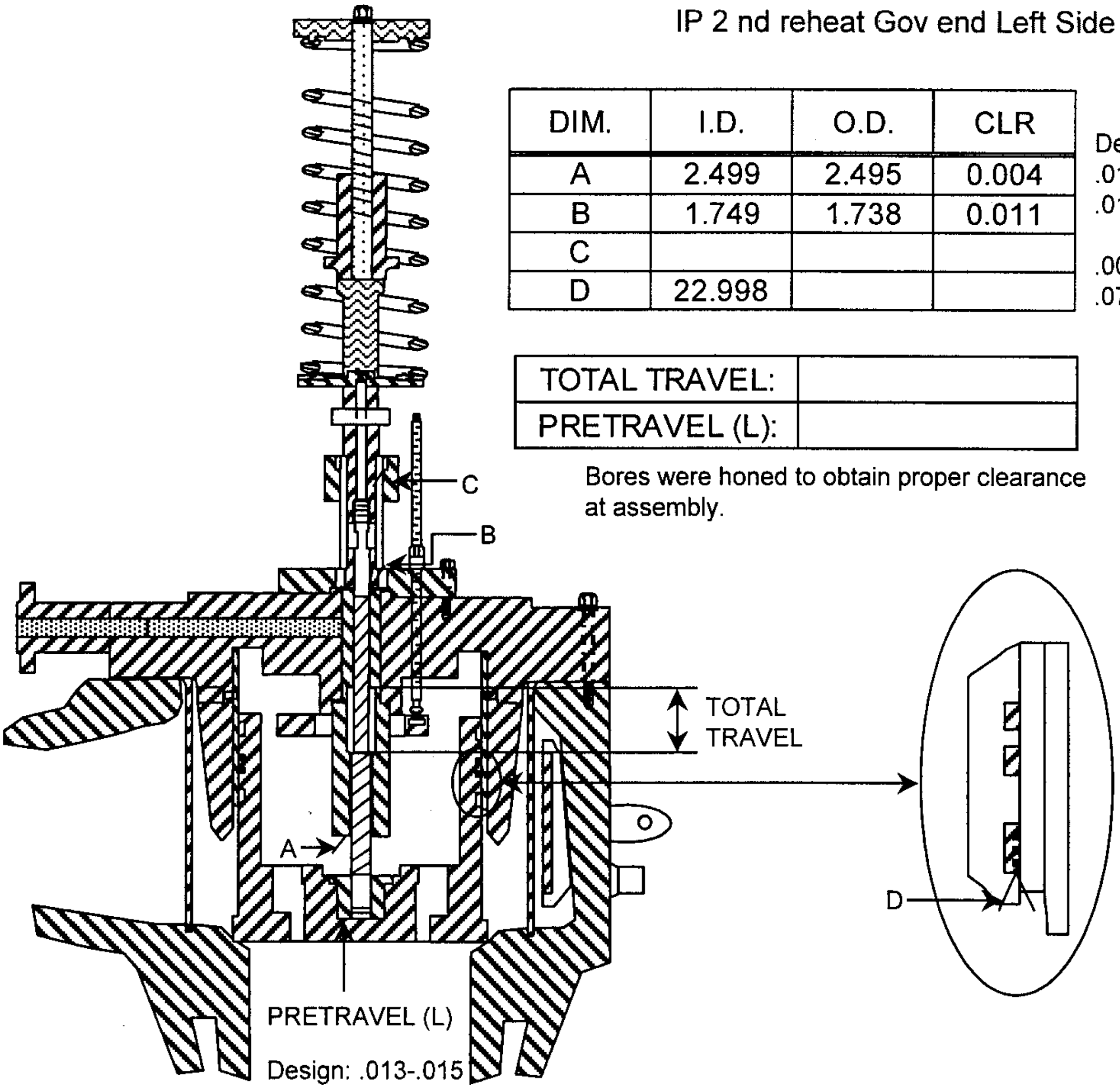
BB/FRAME: JOB NO.:
COMPONENT/S.O.: DWG.:

IP 2 nd reheat Gov end Left Side

DIM.	I.D.	O.D.	CLR	Design
A	2.499	2.495	0.004	.013-.016
B	1.749	1.738	0.011	.013 -.016
C				.001-.004
D	22.998			.076-.080

TOTAL TRAVEL:	
PRETRAVEL (L):	

Bores were honed to obtain proper clearance at assembly.



FILE: IV006.PPT Rev.00

Tool # Used ______________________ Cal. Due Date __________

As Found ____X______ Reading Taken By: ___Day & Night__________________ Date: _9/24/01___

As Assembled ____X______ Reviewed By (W) Eng.: ______________________ Date: __________

SIEMENS
WESTINGHOUSE

CUSTOMER: AEP
LOCATION/UNIT #: MITCHELL 1

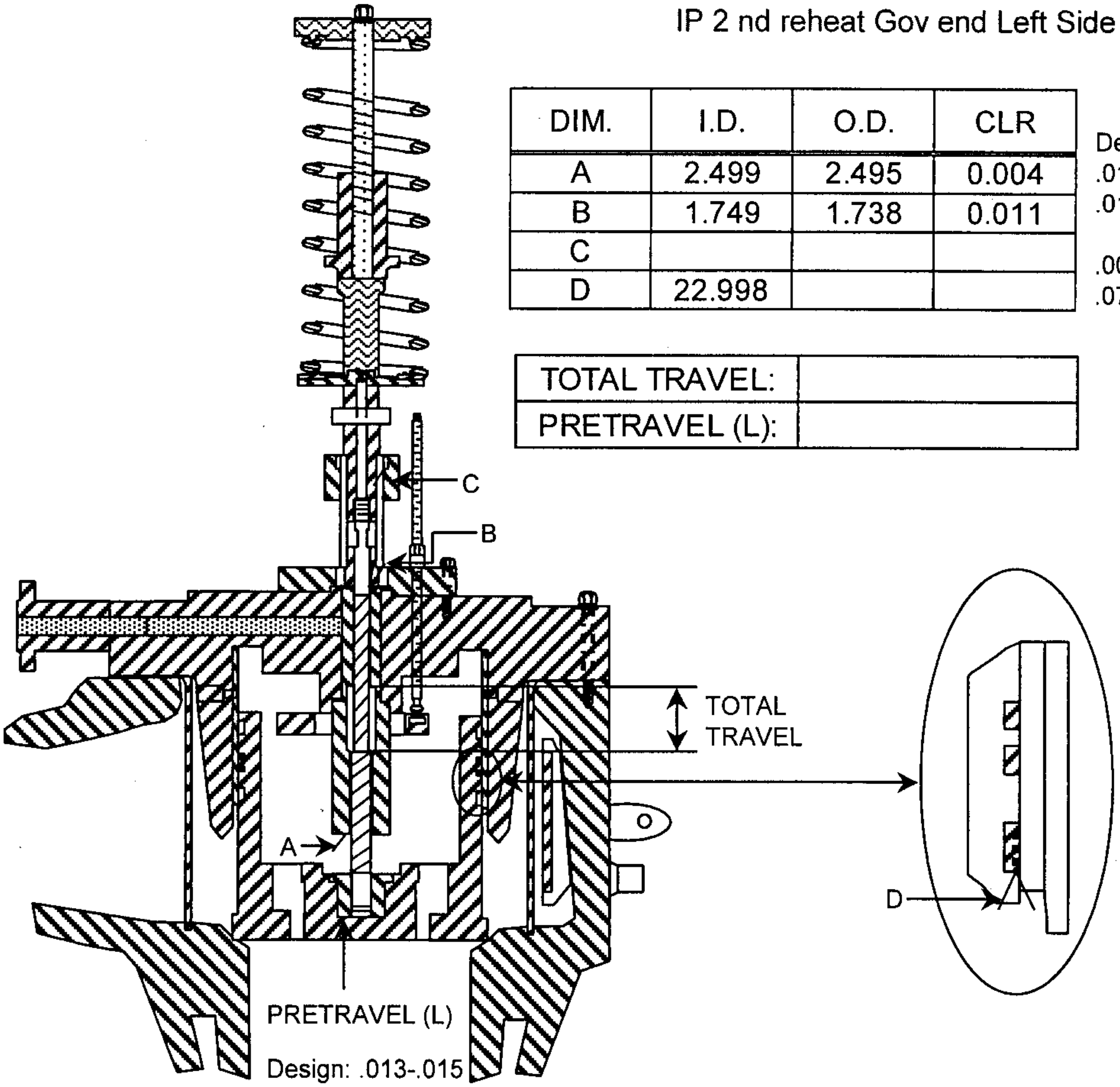
INTERCEPTOR VALVE DIMENSIONS

BB/FRAME: JOB NO.:
COMPONENT/S.O.: DWG.:

IP 2 nd reheat Gov end Left Side

DIM.	I.D.	O.D.	CLR	Design
A	2.499	2.495	0.004	.013-.016
B	1.749	1.738	0.011	.013 -.016
C				.001-.004
D	22.998			.076-.080

TOTAL TRAVEL:	
PRETRAVEL (L):	



FILE: IV006.PPT Rev.00

Tool # Used ____________ Cal. Due Date ________

As Found ____X______ Reading Taken By: ___Day & Night____________ Date: _9/24/01___

As Assembled ________ Reviewed By (W) Eng.: ____________ Date: ________

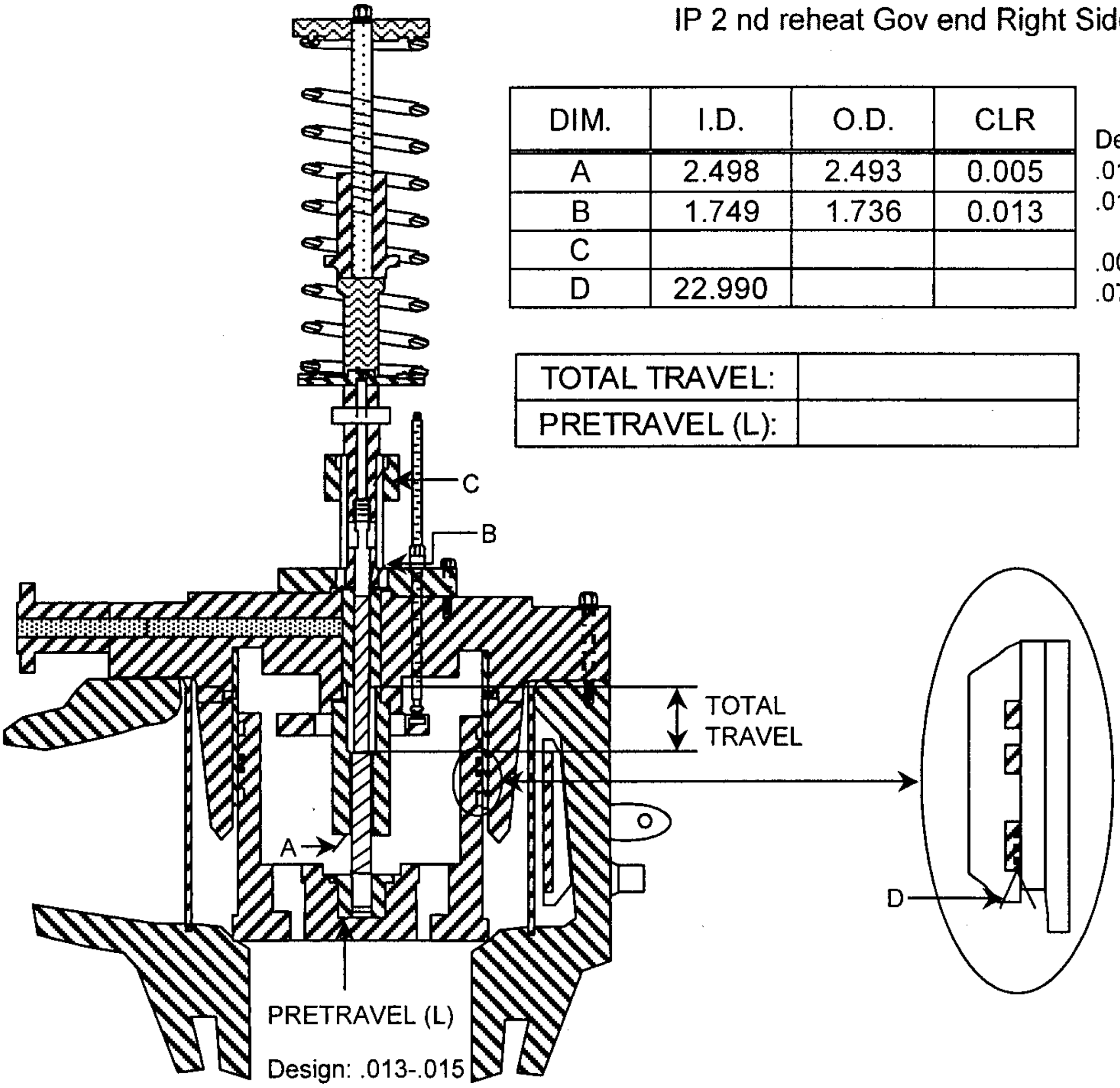
SIEMENS
WESTINGHOUSE

CUSTOMER: AEP	
LOCATION/UNIT #: MITCHELL 1	
INTERCEPTOR VALVE DIMENSIONS	
BB/FRAME:	JOB NO.:
COMPONENT/S.O.:	DWG.:

IP 2 nd reheat Gov end Right Side

DIM.	I.D.	O.D.	CLR	Design
A	2.498	2.493	0.005	.013-.016
B	1.749	1.736	0.013	.013 -.016
C				.001-.004
D	22.990			.076-.080

TOTAL TRAVEL:	
PRETRAVEL (L):	



Design: .013-.015

FILE: IV006.PPT Rev.00

Tool # Used ______________ Cal. Due Date ________

As Found ____X______ Reading Taken By: ___Day & Night______________ Date: _9/24/01___

As Assembled ________ Reviewed By (W) Eng.: ______________ Date: ________

SIEMENS
WESTINGHOUSE

CUSTOMER: AEP
LOCATION/UNIT #: MITCHELL 1

INTERCEPTOR VALVE DIMENSIONS

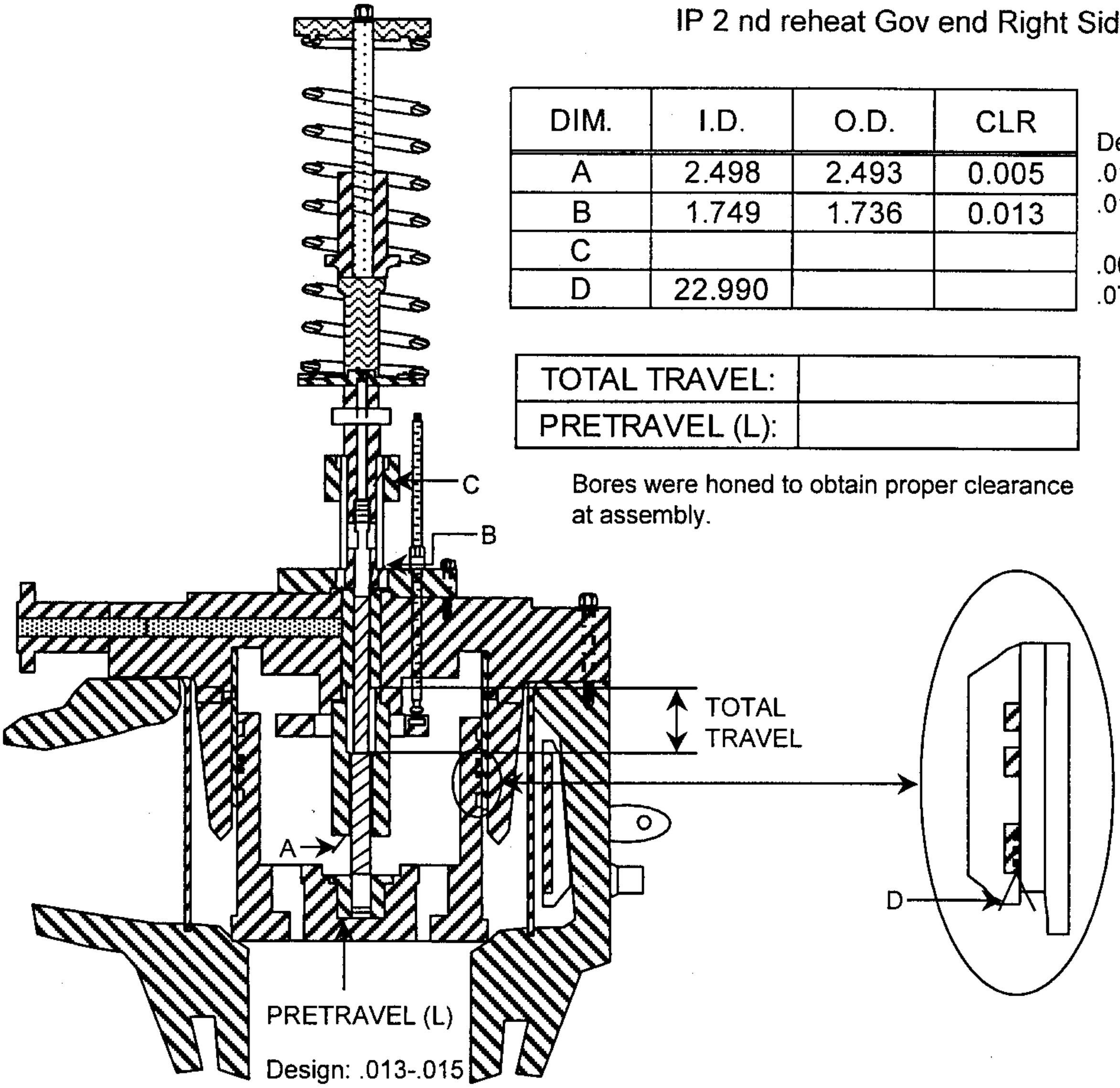
BB/FRAME: JOB NO.:
COMPONENT/S.O.: DWG.:

IP 2 nd reheat Gov end Right Side

DIM.	I.D.	O.D.	CLR	Design
A	2.498	2.493	0.005	.013-.016
B	1.749	1.736	0.013	.013 -.016
C				.001-.004
D	22.990			.076-.080

TOTAL TRAVEL:	
PRETRAVEL (L):	

Bores were honed to obtain proper clearance at assembly.



FILE: IV006.PPT Rev.00

Tool # Used ____________ Cal. Due Date ________

As Found ____X______ Reading Taken By: ___Day & Night____________ Date: _9/24/01___

As Assembled ____X______ Reviewed By (W) Eng.: ____________ Date: ________

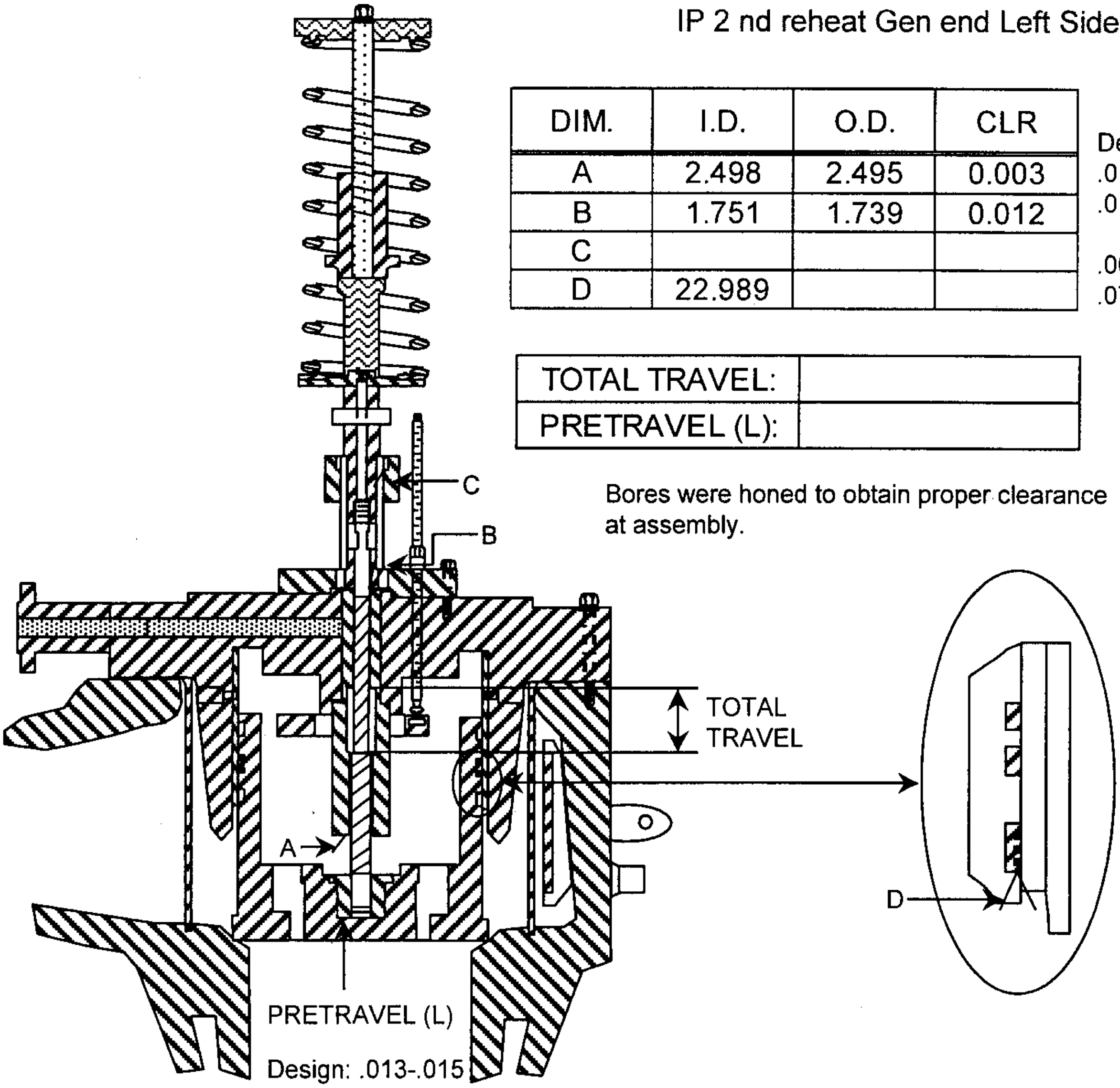
SIEMENS
WESTINGHOUSE

CUSTOMER:	AEP	
LOCATION/UNIT #:	MITCHELL 1	

INTERCEPTOR VALVE DIMENSIONS

BB/FRAME: JOB NO.:

COMPONENT/S.O.: DWG.:



IP 2 nd reheat Gen end Left Side

DIM.	I.D.	O.D.	CLR	Design
A	2.498	2.495	0.003	.013-.016
B	1.751	1.739	0.012	.013 -.016
C				.001-.004
D	22.989			.076-.080

TOTAL TRAVEL:	
PRETRAVEL (L):	

Bores were honed to obtain proper clearance at assembly.

FILE: IV006.PPT Rev.00

Tool # Used ______________ Cal. Due Date ________

As Found ____X______ Reading Taken By: ___Day & Night________ Date: _9/24/01___

As Assembled ____X______ Reviewed By (W) Eng.: ______________ Date: ________

**SIEMENS
WESTINGHOUSE**

CUSTOMER:	AEP	
LOCATION/UNIT #:	MITCHELL 1	

INTERCEPTOR VALVE DIMENSIONS

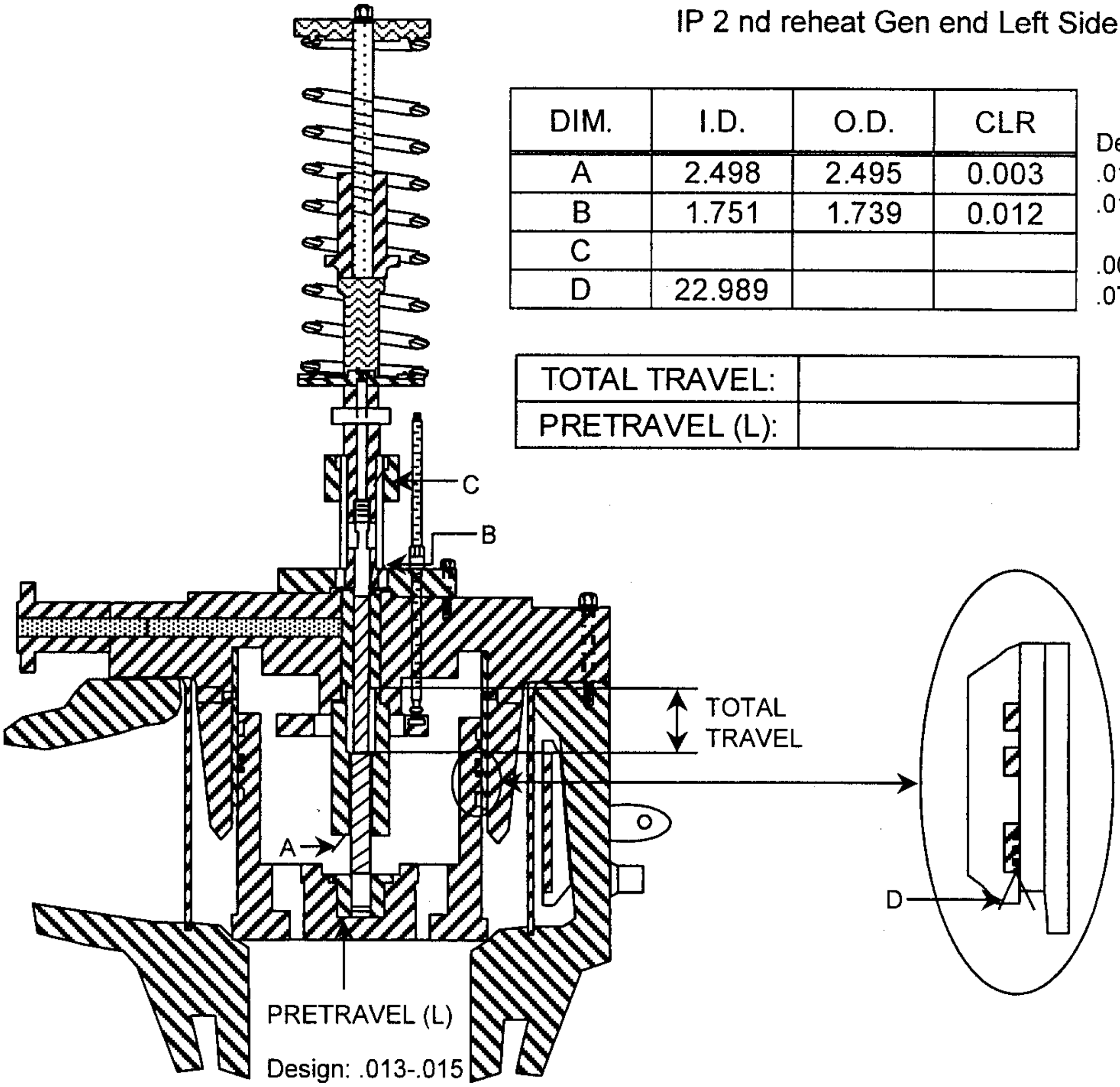
BB/FRAME: JOB NO.:

COMPONENT/S.O.: DWG.:

IP 2 nd reheat Gen end Left Side

DIM.	I.D.	O.D.	CLR	Design
A	2.498	2.495	0.003	.013-.016
B	1.751	1.739	0.012	.013 -.016
C				.001-.004
D	22.989			.076-.080

TOTAL TRAVEL:	
PRETRAVEL (L):	



FILE: IV006.PPT Rev.00

Tool # Used ____________ Cal. Due Date ________

As Found ____X______ Reading Taken By: ___Day & Night__________ Date: _9/24/01___

As Assembled _________ Reviewed By (W) Eng.: ______________ Date: ________

SIEMENS
WESTINGHOUSE

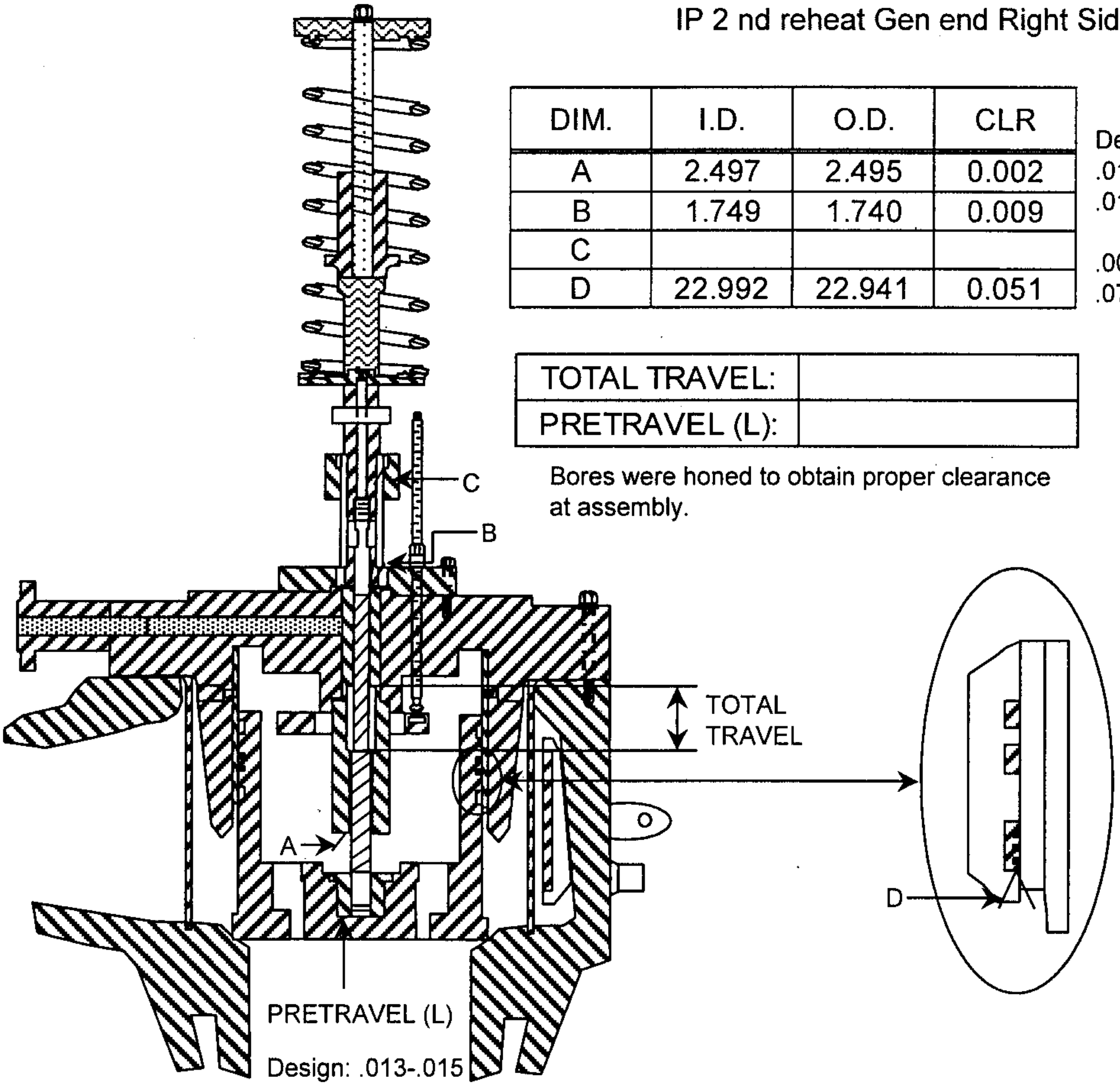
CUSTOMER: AEP	
LOCATION/UNIT #: MITCHELL 1	
INTERCEPTOR VALVE DIMENSIONS	
BB/FRAME:	JOB NO.:
COMPONENT/S.O.:	DWG.:

IP 2 nd reheat Gen end Right Side

DIM.	I.D.	O.D.	CLR	Design
A	2.497	2.495	0.002	.013-.016
B	1.749	1.740	0.009	.013 -.016
C				.001-.004
D	22.992	22.941	0.051	.076-.080

TOTAL TRAVEL:	
PRETRAVEL (L):	

Bores were honed to obtain proper clearance at assembly.



FILE: IV006.PPT Rev.00

Tool # Used ____________________ Cal. Due Date ________

As Found ____X______ Reading Taken By: ___Day & Night________________ Date: _9/24/01___

As Assembled ___X______ Reviewed By (W) Eng.: ____________________ Date: ________

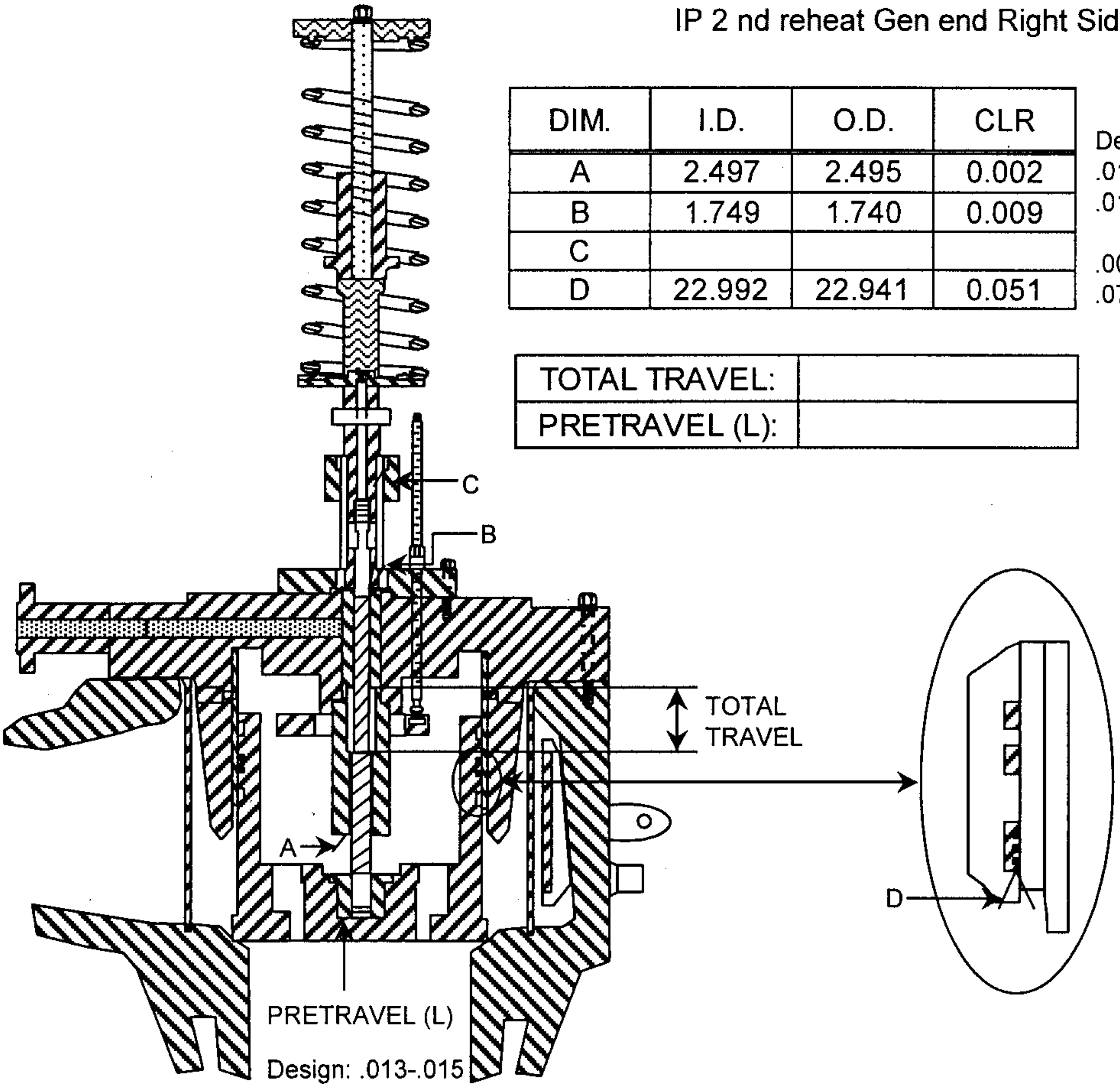
SIEMENS
WESTINGHOUSE

CUSTOMER:	AEP	
LOCATION/UNIT #:	MITCHELL 1	
INTERCEPTOR VALVE DIMENSIONS		
BB/FRAME:		JOB NO.:
COMPONENT/S.O.:		DWG.:

IP 2 nd reheat Gen end Right Side

DIM.	I.D.	O.D.	CLR	Design
A	2.497	2.495	0.002	.013-.016
B	1.749	1.740	0.009	.013 -.016
C				.001-.004
D	22.992	22.941	0.051	.076-.080

TOTAL TRAVEL:	
PRETRAVEL (L):	



Design: .013-.015

FILE: IV006.PPT Rev.00

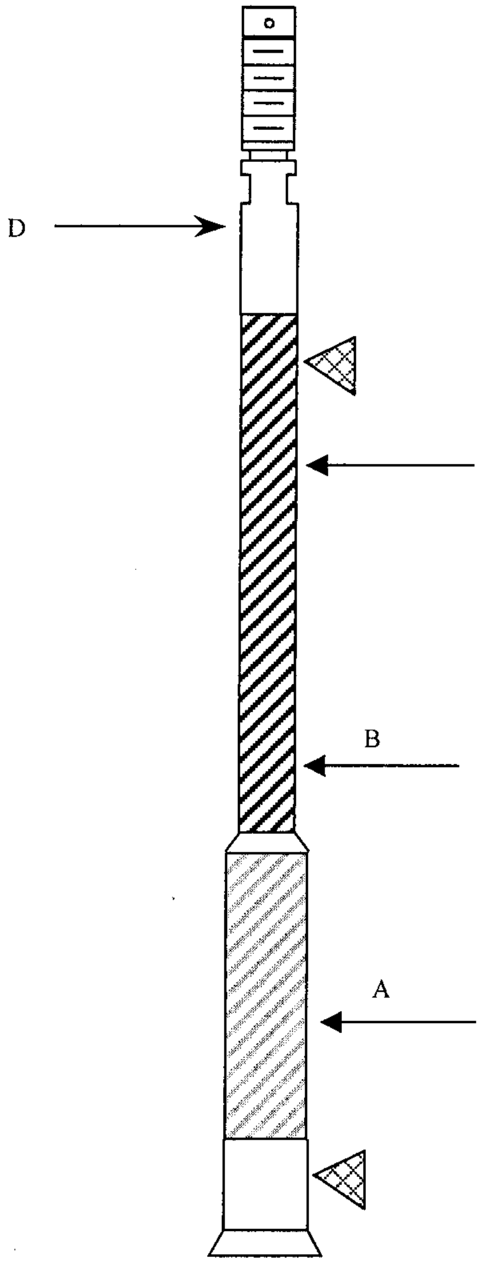
Tool # Used ______________ Cal. Due Date ________

As Found ____X______ Reading Taken By: ___Day & Night______________ Date: _9/24/01___

As Assembled ________ Reviewed By (W) Eng.: ______________ Date: ________

SIEMENS
WESTINGHOUSE

CUSTOMER: AEP	
LOCATION/UNIT #: MITCHELL 1	
INTERCEPTOR VALVE STEM RUNOUT	
BB/FRAME:	JOB NO.:
COMPONENT/S.O.:	DWG.:



HP 1st Reheat Intercept Valves

Runout - Total Indicator Runout (T.I.R.)				
Valve	A	B	C	D
Right	0.001	0	0	0
Left	0.001	0.001	0.001	0.001

NEW STEMS FOR BOTH VALVES

Tool # Used ____________ Cal. Due Date ________

As Found ________ Reading Taken By: _____G. Rahn____________ Date: _9/25/01____

As Assembled _____X_____ Reviewed By (W) Eng.: ____________ Date: ________

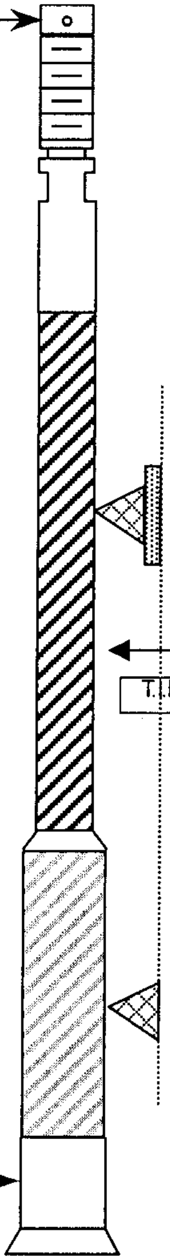
SIEMENS
WESTINGHOUSE

CUSTOMER: AEP
LOCATION/UNIT #: MITCHELL 1

INTERCEPT VALVE STEM RUNOUT

BB/FRAME: JOB NO.:
COMPONENT/S.O.: DWG.:

T.I.R C = 0.027



IP 2nd Reheat Intercept Valve – TE Right Side

Note: stem was not removed from valve body

Shim to level.
Position 1/3 of length from the end.

T.I.R B = 0.011

Position 1/3 of length from the end.

T.I.R A=

Tool # Used ______________ Cal. Due Date ________

As Found _____X_____ Reading Taken By: ____J Brothers______________ Date: _9/22/01____

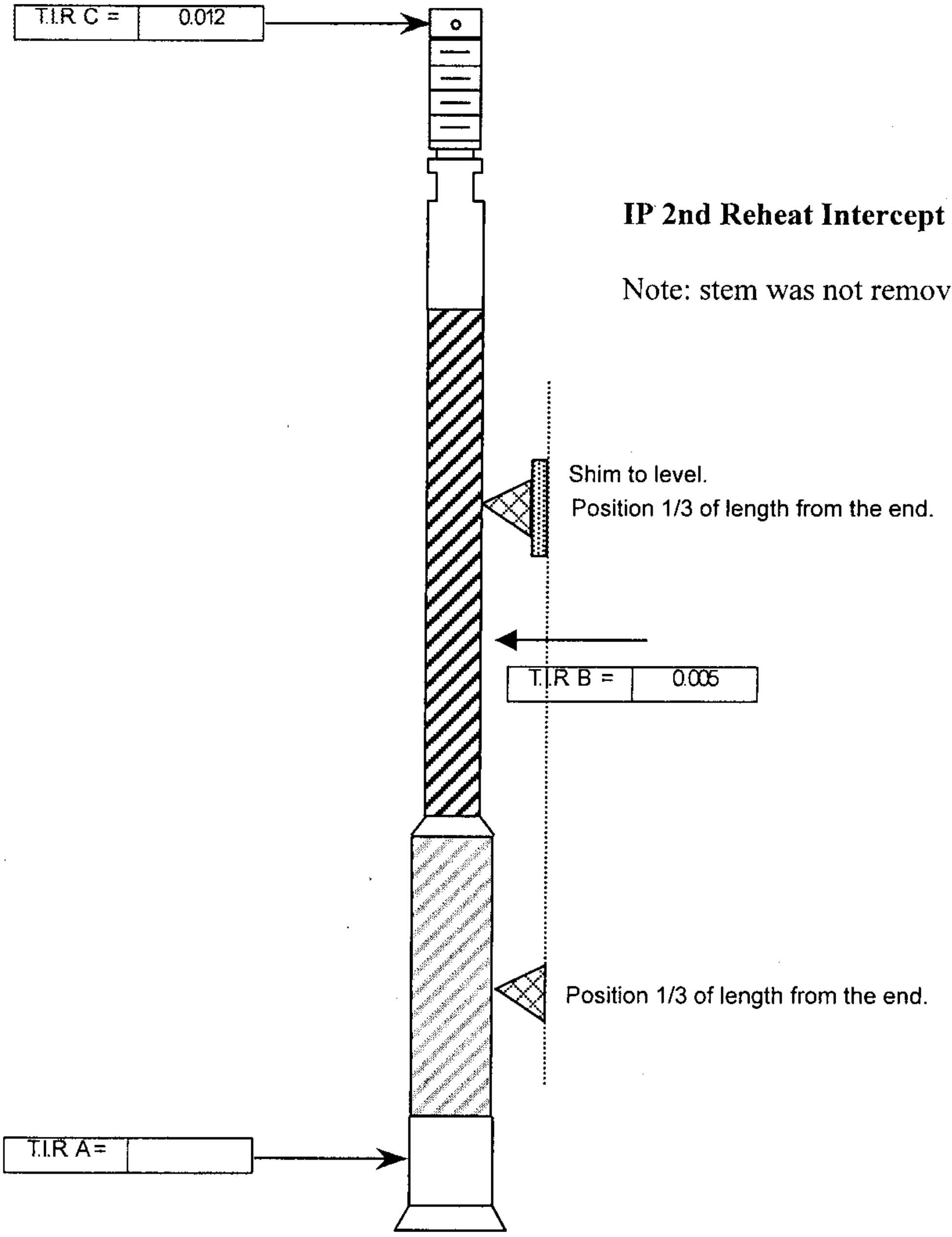
As Assembled _____X_____ Reviewed By (W) Eng.: ______________ Date: ________

SIEMENS
WESTINGHOUSE

CUSTOMER: AEP
LOCATION/UNIT #: MITCHELL 1

INTERCEPT VALVE STEM RUNOUT

BB/FRAME: JOB NO.:
COMPONENT/S.O.: DWG.:



IP 2nd Reheat Intercept Valve – TE Left Side

Note: stem was not removed from valve body

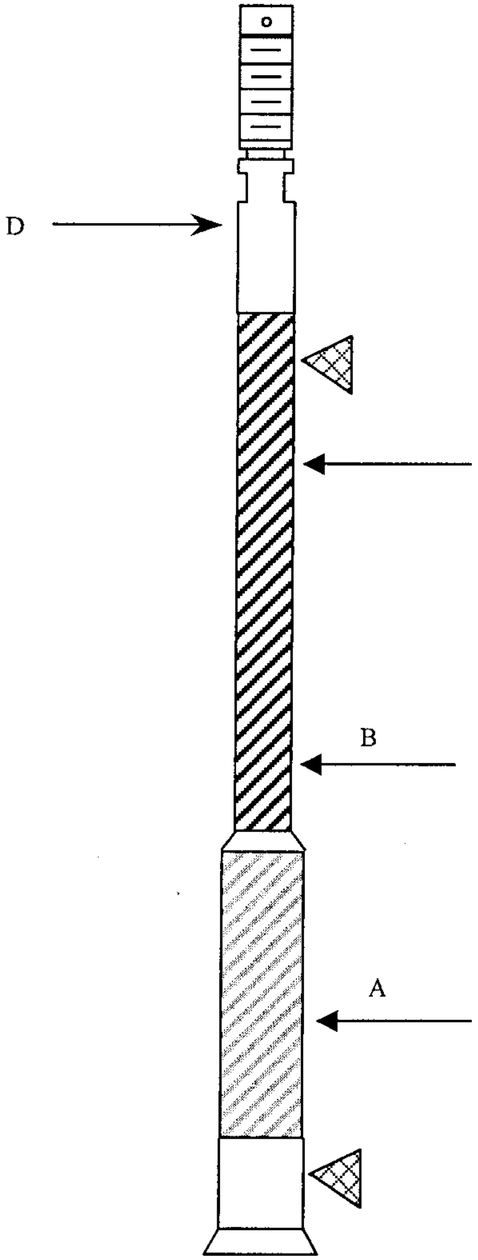
Tool # Used ____________ Cal. Due Date ________

As Found _____X_____ Reading Taken By: ____J Brothers____________ Date: _9/22/01____

As Assembled _____X_____ Reviewed By (W) Eng.: ____________ Date: ________

SIEMENS
WESTINGHOUSE

CUSTOMER: AEP	
LOCATION/UNIT #: MITCHELL 1	
INTERCEPTOR VALVE STEM RUNOUT	
BB/FRAME:	JOB NO.:
COMPONENT/S.O.:	DWG.:



HP 1st Reheat Intercept Valves

Runout - Total Indicator Runout (T.I.R.)				
Valve	**A**	**B**	**C**	**D**
Right	0.013	NT	NT	0.037
Left	0.002	0.005	0.004	0.010

BOTH STEMS WERE REPLACED

Tool # Used ______ Cal. Due Date ______

As Found ____X______ Reading Taken By: _____J. Brothers___________ Date: _9/22/01____

As Assembled ______ Reviewed By (W) Eng.: ______ Date: ______

Reheat Stop Valves

The first reheat stop valves (2) and second reheat stop valves (4) for unit 1 were disassembled and inspected by RSO personnel under job order 3349032-04. Previous troubles were noted with the right side first reheat stop valve, so the work done also completed job order 0663084-01.

The reheat stop valves were completely disassembled. The spring tension was relieved and the lever arms were unpinned. The upper head was removed, the cover plate on the dump valve side was removed, and the operators were removed on the second reheat valves. See below. The shafts were removed from the flapper and the flapper valves were removed.

First Reheat Stop Valves

Prior to the outage, the right side first reheat stop valve had problems opening when the valve was in a cold state. The flapper would bind in a closed position until the valve had warmed up. It was thought that the bushing were out of line, so steps to address this problem were taken during the outage.

All valve components were blast cleaned by Federal Industrial and NDE inspections were performed by CMS personnel. The valve casing internals were blast cleaned and NDE inspected with no cracking noted.

The valve shafts were heavily scaled up when disassembled. As found readings were taken on the shafts and bushings. The shafts were sent to Shuttlers (local machine shop) for cleaning and polishing, and runout readings were taken on the shafts. Both first RSV shafts had excessive runout and were replaced with spare shafts.

The bushings were honed to provide proper clearance to the RSV shafts. While fitting the shaft keys to the flapper arms, it was noted that the key slots were worn. The key slots for the right side RSV were cleaned up so that the keys fit, but the flapper arm for the left side had to be replaced. The shaft keys were fit to the slots of the new arm.

Since it was thought that the right side 1st RSV bushings were out of line, CMS machinists were brought on to site. The operator for the RSV was removed and a boring bar was set up in the bushings on the operator side. The face of the valve casing for the cover on the dump valve side was swept and was significantly out of square.

The face of the casing was machined to correct the perpendicularity, and the cover with the dump valve was machined at CMS to restore the axial clearance necessary for the flapper.

The conical washers were lapped to the shafts and to their sealing bushings. All components were reassembled in the valve casings, and the dump valves and operators were reinstalled. The flapper axial clearance was checked for both valves when reassembled, and was within design limits. Both valves operated freely when assembled. The bolting for the upper heads was torqued using the Plarad torque wrench. All data taken is included with this report.

Second Reheat Stop Valves

As a note regarding disassembly and reassembly of the second reheat stop valves: During typical RSV disassembly, the cover plate on the dump valve side is removed, and the reheat valve shaft is pushed through the flapped out the dump valve side. This procedure is used for the first reheat stop valves at Mitchell and the operators do NOT have to be removed. On the second reheat stop valves at Mitchell, there is not enough room between the valves to allow the shaft to be removed out the dump valve side, so the operator assembly has to be removed. During disassembly, the shaft has to be pushed out part way towards the dump valve side, the operator can then be removed, and the shaft is the pushed out towards the operator side.

All valve components were blast cleaned by Federal Industrial and NDE inspections were performed by CMS personnel. The valve casing internals were blast cleaned and NDE inspected with no cracking noted.

The valve shafts were heavily scaled up when disassembled. As found readings were taken on the shafts and bushings. The shafts were sent to Shuttlers (local machine shop) for cleaning and polishing, and runout readings were taken on the shafts. Three of the four RSV shafts had excessive runout, however no spare shafts were available. Siemens-Westinghouse and other vendors were called and the shortest lead time for new shafts was 6 weeks. Since cold straightening the shafts carries the risk of cracking the shafts, it was decided to reuse the shafts as found and replace them during the next outage.

The bushings were honed to provide proper clearance to the RSV shafts, and the clearances were taken to the higher end of the limits to partly compensate for the shaft runouts. The shaft keys were fit to the slots of the flapper arms, but were a bit sloppy in two of the valves. This was due to wear in the key slot causing the slot to be slightly V shaped.

The conical washers were replaced in three of the valves. The washers were lapped to the shafts and to their sealing bushings. All components were reassembled in the valve casings, and the dump valves and operators were reinstalled. The flapper axial clearance was checked for both valves when reassembled, and was within design limits. The bolting for the upper heads was torqued using the Plarad torque wrench.

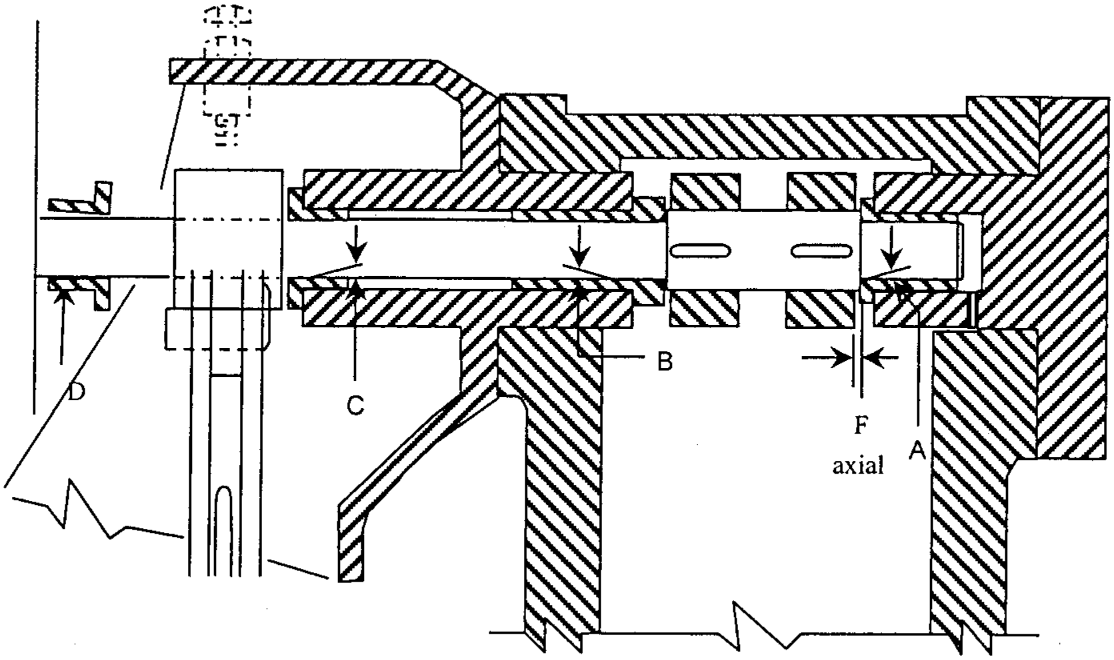
All data taken is included with this report. During the next outage, three spare shafts for the 2nd reheat stop valves should be in stock to allow replacement of the three with excessive runout; (TE-left, GE-left, GE-right). New keys will also be needed for these valves.

Siemens
Westinghouse

CUSTOMER: AEP
LOCATION/UNIT #: MITCHELL 1

REHEAT STOP VALVE

BB/FRAME: JOB NO.:
COMPONENT/S.O.: DWG.: 720J702



LEFT VALVE CLEARANCE DATA - HP First Reheat

	AS FOUND			AS LEFT		
DIA	I.D.	O.D.	CLR	I.D.	O.D.	CLR
A	4.873	NT		4.873	4.866	0.007
B	4.620	NT		4.620	4.608	0.012
C	4.625	NT		4.625	4.608	0.017
D	4.505	NT		4.505	4.483	0.022
F (Axial)						

RIGHT VALVE CLEARANCE DATA -HP First Reheat

	AS FOUND			AS LEFT		
DIA	I.D.	O.D.	CLR	I.D.	O.D.	CLR
A	4.863	4.871	-0.008	4.880	4.866	0.014
B	4.616	4.612	0.004	4.624	4.609	0.015
C	4.605	4.609	-0.004	4.628	4.610	0.018
D	4.506	4.484	0.022	4.503	4.484	0.019
F (Axial)						0.115

Note: Installed new stems on both valves. All bushings were honed to proper diametric clearance at final assembly. Left side valve had new arm assembled to flapper valve.

As Found _____X_____ Reading Taken By: ___T. Fankhauser_______ Date: _9/23/01__

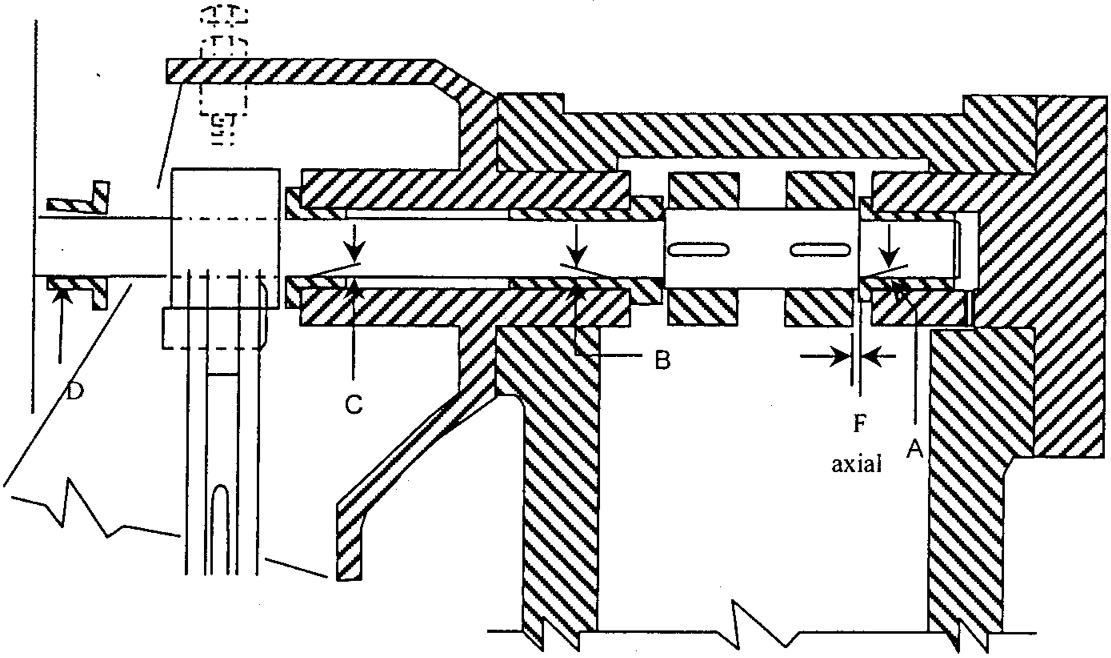
As Assembled ___X_____ Reviewed By (W) Eng.: ____________________ Date: __

Siemens
Westinghouse

CUSTOMER: AEP
LOCATION/UNIT #: MITCHELL 1

REHEAT STOP VALVE

BB/FRAME: JOB NO.:
COMPONENT/S.O.: DWG.: 720J702



LEFT VALVE CLEARANCE DATA - IP 2nd Reheat Gov. end (lower)

	AS FOUND			AS LEFT		
DIA	I.D.	O.D.	CLR	I.D.	O.D.	CLR
A	4.871	4.870	0.001	4.871	4.847	0.024
B	4.617	4.610	0.007	4.617	4.59	0.027
C	4.627	4.609	0.018	4.627	4.599	0.028
D	4.498	4.482	0.016	4.498	4.479	0.019
F (Axial)						

RIGHT VALVE CLEARANCE DATA -IP 2nd Reheat Gov. end (lower)

	AS FOUND			AS LEFT		
DIA	I.D.	O.D.	CLR	I.D.	O.D.	CLR
A	4.880	4.861	0.019	4.880	4.836	0.044
B	4.610	4.611	-0.001	4.610	4.583	0.027
C	4.622	4.604	0.018	4.622	4.598	0.024
D	4.500	4.481	0.019	4.500	4.478	0.022
F (Axial)						

Tool # Used ______________________ Cal. Due Date __________

As Found _____X_____ Reading Taken By: ___Day & Night shift________ Date: _9/26/01__

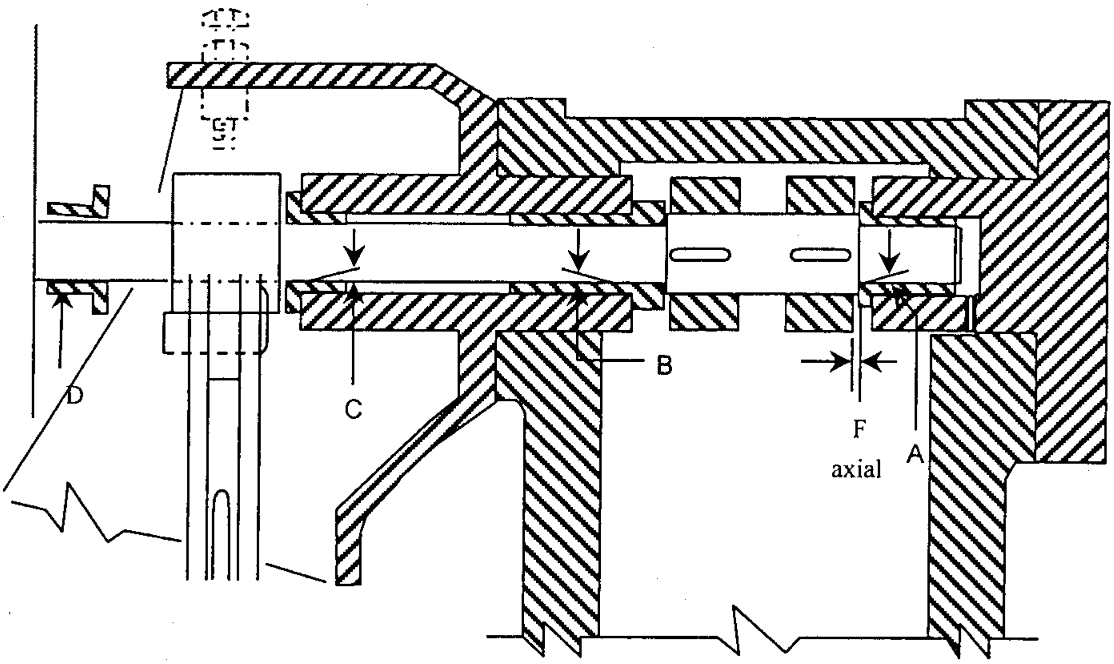
As Assembled ____X_____ Reviewed By (W) Eng.: ____________________ Date: __

Siemens
Westinghouse

CUSTOMER: AEP
LOCATION/UNIT #: MITCHELL 1

REHEAT STOP VALVE

BB/FRAME:
JOB NO.:
COMPONENT/S.O.:
DWG.: 720J702



LEFT VALVE CLEARANCE DATA - IP 2nd Reheat Gen. end (upper)

	AS FOUND			AS LEFT		
DIA	I.D.	O.D.	CLR	I.D.	O.D.	CLR
A	4.875	4.854	0.021	4.875	4.833	0.042
B	4.611	4.594	0.017	4.611	4.586	0.025
C	4.622	4.605	0.017	4.622	4.602	0.020
D	4.496	4.480	0.016	4.496	4.474	0.022
F (Axial)						

RIGHT VALVE CLEARANCE DATA -IP 2nd Reheat Gen. end (upper)

	AS FOUND			AS LEFT		
DIA	I.D.	O.D.	CLR	I.D.	O.D.	CLR
A	4.868	4.857	0.011	4.868	4.839	0.029
B	4.620	4.597	0.023	4.620	4.585	0.035
C	4.624	4.602	0.022	4.624	4.600	0.024
D	4.499	4.480	0.019	4.499	4.478	0.021
F (Axial)						

Tool # Used ______________________ Cal. Due Date __________

As Found _____X_____ Reading Taken By: ___Day & Night shift________ Date: _9/26/01__

As Assembled ____X_____ Reviewed By (W) Eng.: ____________________ Date: __

**SIEMENS
WESTINGHOUSE**

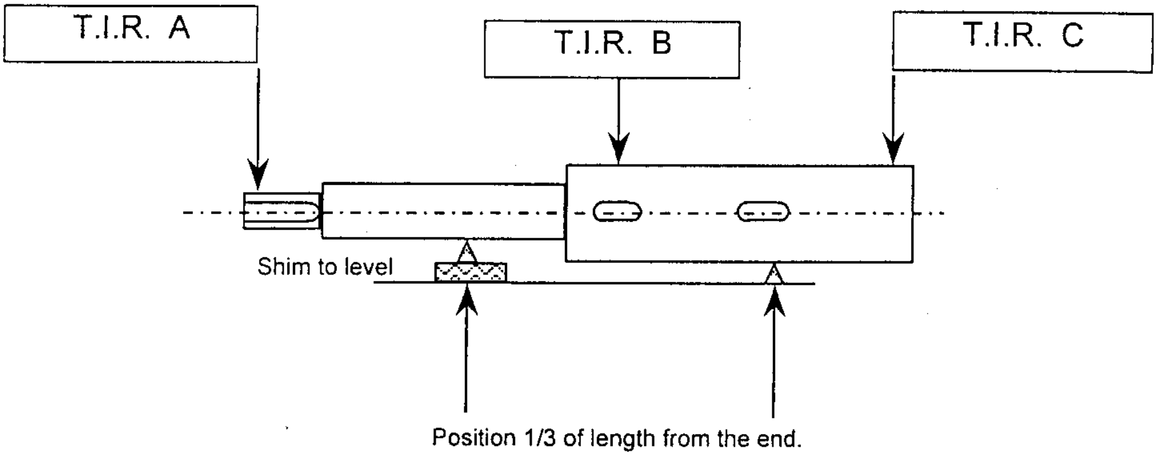
CUSTOMER:
LOCATION/UNIT #:

REHEAT STOP VALVE SHAFT RUNOUT

BB/FRAME: JOB NO.:
COMPONENT/S.O.: DWG.:

Reheat Valve Shaft Runout

Valve #	TIR A	TIR B	TIR C
1st Reheat - Left	0.008	0.003	0.015
1st Reheat - Right	0.010	0.002	0.019
2nd Reheat - TE/L	0.009	0.002	0.009
2nd Reheat - TE/R	0.001	0.001	0.003
2nd Reheat - GE/L	0.014	0.004	0.015
2nd Reheat - GE/R	0.012	0.003	0.013



Total TIR equals B plus the largest of A or C.

FILE: RV003.PPT Rev. 00

Tool # Used ______________________________ Cal. Due Date __________

As Found _____X_____ Reading Taken By: ________Shuttlers________________ Date: _9/20/01___

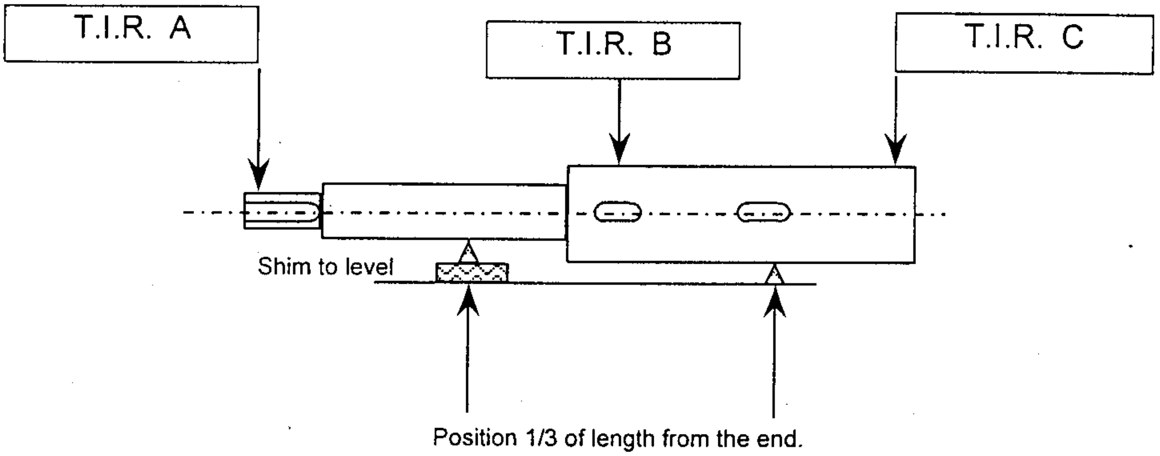
As Assembled __________ Reviewed By (W) Eng.: ______________________________ Date: __________

**SIEMENS
WESTINGHOUSE**

CUSTOMER:	
LOCATION/UNIT #:	
REHEAT STOP VALVE SHAFT RUNOUT	
BB/FRAME:	JOB NO.:
COMPONENT/S.O.:	DWG.:

Reheat Valve Shaft Runout

Valve #	TIR A	TIR B	TIR C
1st Reheat - Left	0.000	0.000	0.000
1st Reheat - Right	0.000	0.000	0.000
2nd Reheat - TE/L	0.010	0.005	0.010
2nd Reheat - TE/R	0.008	0.003	0.006
2nd Reheat - GE/L	0.005	0.007	0.011
2nd Reheat - GE/R	0.011	0.002	0.007



Total TIR equals B plus the largest of A or C.

Note: New shafts were installed in both 1st Reheat Stop Valves.

FILE: RV003.PPT Rev 00

Tool # Used ____________________ Cal. Due Date __________

As Found __________ Reading Taken By: ________J. Brothers______________ Date: _9/26/01___

As Assembled ____X______ Reviewed By (W) Eng.: ____________________ Date: __________

Lube Oil System

Lube Oil Pumps

Both turning gear oil pumps were disassembled and removed for inspection. Please note that the pump heads had to be removed from the pumps in order to remove them from the oil tanks. Both pumps were sent to RPM for inspection and rebuild.

After the pumps were returned to site, they were disassembled, installed into the lube oil tank, and then reassembled. The motors were reinstalled. No work had been done to the motors.

Bearing Lift Pump

The bearing lift pump was not inspected during the outage. Just prior to maintenance release, the lift of the LP bearings (T-5 thru T-8) was checked. Two flow regulators were changed out (T-5 and T-7) to get lift at all 4 bearings.

During the start-up sequences, the bearing lift pump failed. The lift pump was replaced with a spare pump from ML stores, but this pump also failed. While a new pump was ordered, parts were scavenged from the two bad lift pumps to make one usable pump.

This pump was installed and used during the start-ups. Some extra isolation valves and piping were installed to allow the lift pump to be changed out without shutting down the lube oil.

During the mini-outage to change out the fine mesh strainers, the new lift pump was received and installed. This pump operated properly. Another spare pump should be stocked as a spare.

Lube Oil Coolers

The oil cooler heads were removed. The tube bundles were washed with high pressure water by Gap personnel. The coolers heads were sent out for cleaning and were coated. The coolers heads were reinstalled.

The coolers were water tested and leaked three times before they were sealed properly. The faces of the cooler heads need to be restored at the next outage. No tube leaks into the oil tank were noticed,

Lube Oil Tank

The oil was drained from the tank to a storage tank. RSO personnel added some pressure taps to piping inside the tank for the new control system. RSO personnel cleaned out the tank until it passed inspection done by Mitchell plant lab personnel.

Lube Oil Flush

A seal oil flush was done prior to the lube oil flush. The hydrogen seals were bypassed from feed line to hydrogen side drain. This allowed the seal oil system to be flushed without makeup oil from the lube oil system. Samples were taken and the seal oil flush was approved by Mitchell Lab personnel.

An oil flush was done after all of the bearing standards were reassembled. This included both of the feed pump turbine bearings. The oil was flushed through the turbine bearings with the exception of the new T-11 bearing. The T-11 bearing was bypassed from feed to drain so that the new piping would be cleaned without flushing dirt into the bearing.

The seal oil system was valved out from the lube oil system during the oil flush. Oil samples were taken through out the flush and the seal oil flush was shut down after approval by Mitchell Lab personnel.

After flushing was completed, the lube oil tank was drained and cleaned again. The piping to T-11 bearing was restored.

Drainage Gutter

Oil vapor would accumulate on the lube oil tank, running down the sides of the tank. To fix this problem, the plant requested that gutters be installed on the lube oil tank.

One gutter for each side of the tank were fabricated at Shuttlers. These gutters were stitch welded on the lube oil tank after the lead paint had been abated. The tops of the gutters were seal to the tank with RTV. A hose ran from the gutters to a 50 gallon drum to dispose of any waste oil that made it to the gutters.

Filtering System

A turbo-toc filtering system was installed on the fill line to the lube oil tank.

Turbine Alignment

Centerline Alignment

Rotor axial and radial positions were taken at all of the bearing standards prior to the couplings being disassembled. Even with the HP and LP "A" bearings being at least partially wiped, the rotor positions served as our set points for centerline alignment.

HP Turbine

The HP turbine was aligned using the tightwire method. A set of desired positions were provided for the alignment by Jim Cable of the turbine engineering group. These desired positions were calculated from prior tops-on tops-off tightwire alignment and prior out-of-round data. A copy of the desired blade and dummy ring positions is included with this section.

The inner shell and all of the blade rings and dummy rings were installed and were pushed to the right. Since the inner gland casings had not been, they served as the set points for our alignment program.

A tightwire was strung and was set at the desired positions at the TE middle packing gland and the GE middle packing gland. The first set of data showed that all of the blade rings and dummy rings were too far to the right. The side slip of the inner shell was checked and there was over 0.035" movement. All of the blade rings and dummy rings were removed, and the inner shell was pulled from the machine.

The fits on the inner shell were weld repaired to correct the excessive side movement. The inner shell was reinstalled and the side movement was checked and approved by the Westinghouse service rep. All of the blade rings and dummy rings were reinstalled.

A tightwire was strung and was set at the desired positions at the TE middle packing gland and the GE middle packing gland again. The blade rings and dummy rings were all checked to the tightwire. All of the blade rings, dummy rings, and gland rings were adjusted until their position was within 0.003" of the desired positions.

The side movement of all of the blade rings and dummy rings was checked. This side movement was corrected until all of the blade rings had less than 0.005" movement.

The tightwire was also checked to the oil bores and was compared with the as found rotor radial positions. This indicated that a shell move was likely. No tightwire readings were taken to the bearings.

After the alignment, all of the elevation keys were checked for proper clearance with the upper half components.

The outer packing gland casings had been unbolted earlier in the outage. The outer packing glands were aligned directly to the rotor after the rotor was installed.

The coupling alignment positioned the rotor so that the radial positions at T-1 and T-2 bearings were acceptable left to right. The GE shell arm keys needed to be adjusted to correct for the elevation difference in the radial position at T-2 oil deflector. This is further described in the coupling alignment section.

All desired elevations, final tightwire positions, and blade ring drop checks are included in this section.

LP A Turbine

Opening radial positions were taken at T-5 and T-6 oil deflector fits. Prior to the removal of the blade rings, drop checks (both radial and elevation checks) were taken from the blade rings to the LP casing. Drop checks were also taken on the packing gland casings before they were removed.

After all of the shells and blade rings were blasted and repaired, the blade rings were reinstalled. Rather than doing a tightwire alignment, the blade rings were returned to their as-found drop check positions. Minor shim changes were necessary to move the blade rings.

After the rotor was installed, the outer packing glands were aligned directly to the rotor.

Data sheets for the LP blade ring drop checks are included with this section.

Tightwire Readings

HP Turbine

Plant ML Unit 1 Turbine Serial No. ____

Date 10/11/01 As Found/Final FINAL Prepared by Composite Data

LOCATION	Distance from TE	Sag Mils	Raw Data Readings In Inches			Relative Position (Sag Corrected in mils)			True Position	
									Elev	Horz
T-1 Oil Deflector Fit	8	1.7	11.640		11.086	554		0	2534	277
				13.895			2811			
TE outer gland ring	15	3.1	0.586		0.565	21		0	-109	11
				0.463			-99			
TE middle gland ring	28	5.4	0.206		0.194	12		0	5	6
(SET POINT)				0.200			11			
TE Inner gland ring	33	6.3	0.991		0.976	15		0	9	8
				0.986			16			
HP Blade Ring - Row 10	59	9.7	0.420		0.397	23		0	17	12
				0.416			29			
HP Blade Ring - Row 8	77	11.4	0.387		0.381	6		0	22	3
				0.395			25			
HP Dummy Ring	100	12.6	0.790		0.775	15		0	37	8
				0.807			45			
VHP Dummy Ring - TE	104	12.7	0.324		0.315	9		0	45	5
				0.352			50			
VHP Dummy Ring - GE	115	12.9	0.318		0.311	7		0	40	4
				0.342			44			
Nozzle seal tooth	107	12.8	0.408		0.389	19		0	46	9
				0.432			56			
VHP Blade Ring - Row 2	79	11.5	0.540		0.532	8		0	36	4
				0.560			40			
VHP Blade Ring - Row 5	67	10.6	0.741		0.732	9		0	31	5
				0.757			36			
LP Dummy Ring	46	8.2	0.673		0.670	3		0	-5	2
				0.658			-4			
GE Inner gland ring	39	7.2	0.213		0.216	0		3	9	-2
				0.216			10			
GE Middle Gland Ring	34	6.4	0.198		0.205	0		7	20	-3
(SET POINT)				0.215			23			
GE Outer Gland	24	4.8	0.603		0.558	45		0	14	23
				0.590			37			
T-2 Oil Deflector Fit	18	3.7	15.495		15.510	0		15	-1131	-8
				14.368			-1123			
End of Bracket	233	0.0								

Tightwire Readings

HP Turbine - Desired Alignment

Plant ML Unit 1 Turbine Serial No. ________

Date 10/9/01 As Found/Final ________ Prepared by Jim Cable

LOCATION	Distance from TE	Sag Mils	Raw Data Readings In Inches			Relative Position (Sag Corrected in mils)			True Position	
									Elev	Horz
T-1 Oil Deflector Fit						532		0		
							2805			
TE outer gland ring						5		0		
							-5			
TE middle gland ring						12		0		
							10			
TE Inner gland ring						12		0		
							14			
HP Blade Ring - Row 10						15		0		
							28			
HP Blade Ring - Row 8						15		0		
							28			
HP Dummy Ring						10		0		
							43			
VHP Dummy Ring - TE						7		0		
							44			
VHP Dummy Ring - GE						7		0		
							44			
Nozzle seal tooth						4		0		
							71			
VHP Blade Ring - Row 2						8		0		
							38			
VHP Blade Ring - Row 5						8		0		
							38			
LP Dummy Ring						0		0		
							-7			
GE Inner gland ring						0		4		
							14			
GE Middle Gland Ring						0		7		
							23			
GE Outer Gland Ring						0		3		
							-5			
T-2 Oil Deflector Fit						0		37		
							-1134			
End of Bracket										

Blade Rings

Side Movement

Plant & Unit ML Unit 1 Prepared by Composite Data

Date(m/d/y) 10/11/01 s Found / Final Data Final rbine S/N:

Data Final (As Found/Final)

Section VHP / HP (HP/LP)

Levelness Maximum 1 Mils/Inch

Centering Pin Clearance Max. 5 Mils

Centering Pin Clearance Min. 1 Mils

Notes:

1. Diaphragm above casing record as PLUS (+).
2. Diaphragm below casing record as MINUS (-).

Lower Half Diaphragms

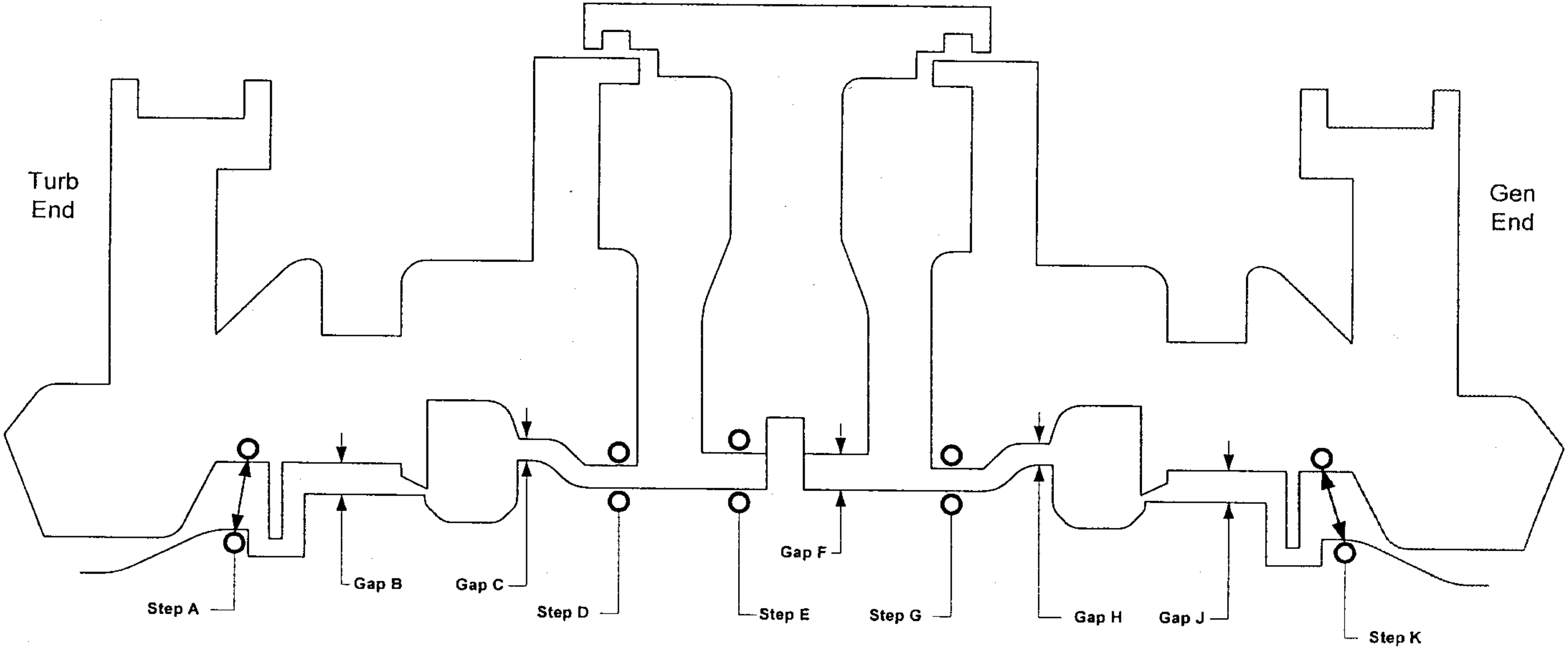
Location	Actual Drop Left Mils	Actual Drop Right Mils	Levelness Diameter Inch	Levelness Level Mil/Inch	Spacers Left Mils	Spacers Right Mils	Side Slip
HP Inner Shell							.010"
TE Middle Gland							.002"
TE Inner Gland							.002"
HP Blade Ring							.010"
HP Dummy Ring							.001"
VHP Dummy Ring							.001"
VHP Blade Ring							.010"
LP Dummy Ring							.004"
GE Inner Gland							.006"
GE Middle Gland							.001"

LP Blade Ring Alignment

Date: 9/13/01

Plant & Unit: Mitchell Unit 1

Prepared By: Doug Fox



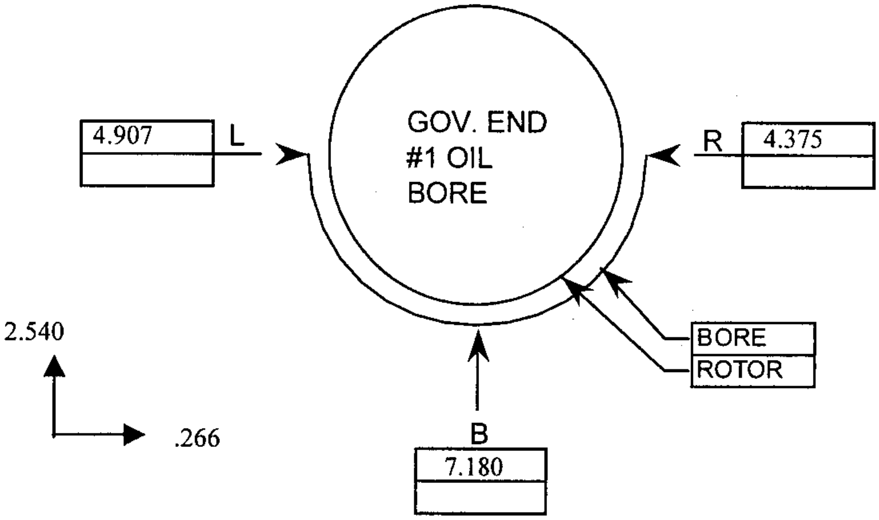
Reading	As Found Blade Ring Positions		As Left Blade Ring Positions	
	Left Side	Right Side	Left Side	Right Side
Step A	0.004	0.013	0.003	0.003
Gap B	0.983	0.955	1.000	0.961
Gap C	0.316	0.271	0.321	0.284
Step D	0.014	0.009	0.014	0.012
Step E	0.097	0.067	0.093	0.063
Gap F	0.829	0.974	0.825	0.967
Step G	0.005	0.013	0.006	0.013
Gap H	0.285	0.277	0.295	0.282
Gap J	0.955	0.946	0.969	0.968
Step K	0.001	0.001	0.001	0.001

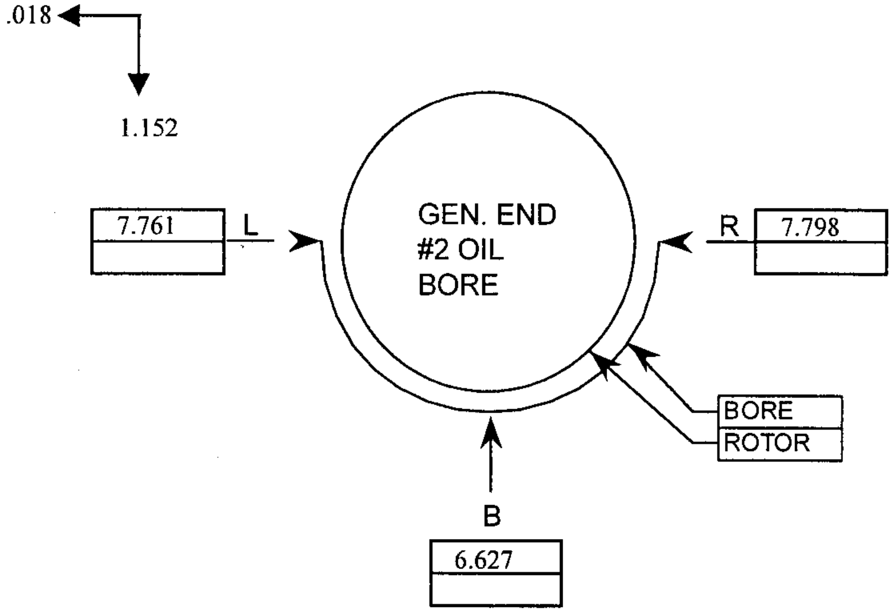
SIEMENS
WESTINGHOUSE

CUSTOMER: AEP
LOCATION/UNIT #: Mitchell #1

VHP/HP OIL BORE READING

BB/FRAME: JOB NO.:
COMPONENT/S.O.: VHP/HP ROTOR





Tool # Used ______________________ Cal. Due Date ________

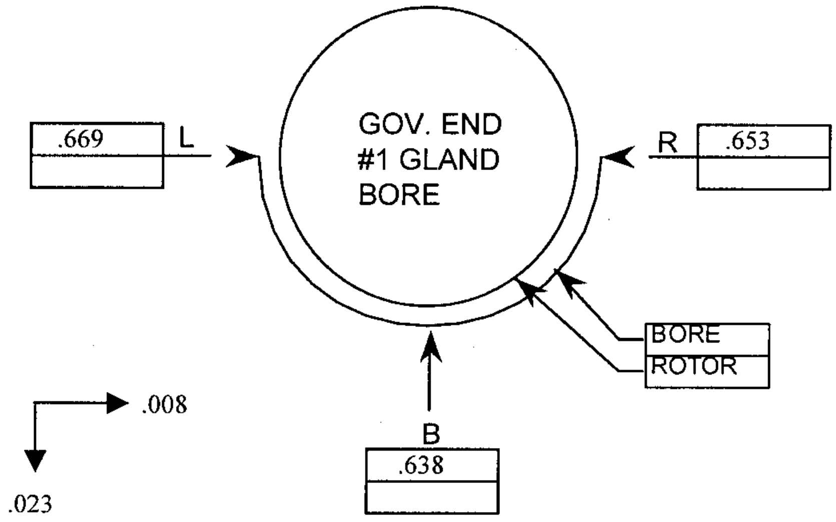
As Found _____X_____ Reading Taken By: _Brothers, Day & Night Shift________ Date: _9/10/01___

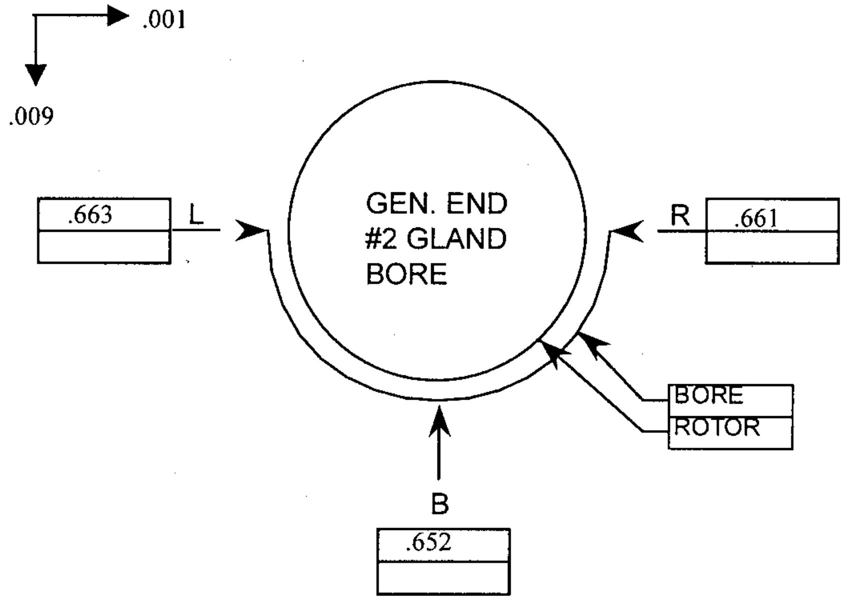
As Assembled ________ Reviewed By (W) Eng.: ______________________ Date: ________

HP023.PPT Rev. 01

SIEMENS
WESTINGHOUSE

CUSTOMER:	AEP	
LOCATION/UNIT #:	Mitchell #1	
VHP/HP GLAND BORE		
BB/FRAME:		JOB NO.:
COMPONENT/S.O.:	VHP/HP ROTOR	





FILE: HP023.PPT Rev. 01

Tool # Used ______________________________ Cal. Due Date __________

As Found _____X_____ Reading Taken By: ___Brothers, Day & Night Shift________ Date: _9/10/01_____

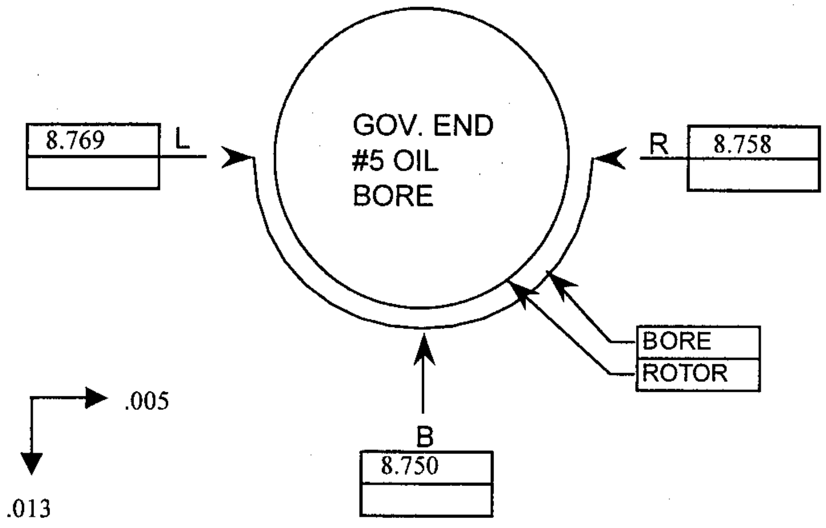
As Assembled __________ Reviewed By (W) Eng.: ______________________________ Date: __________

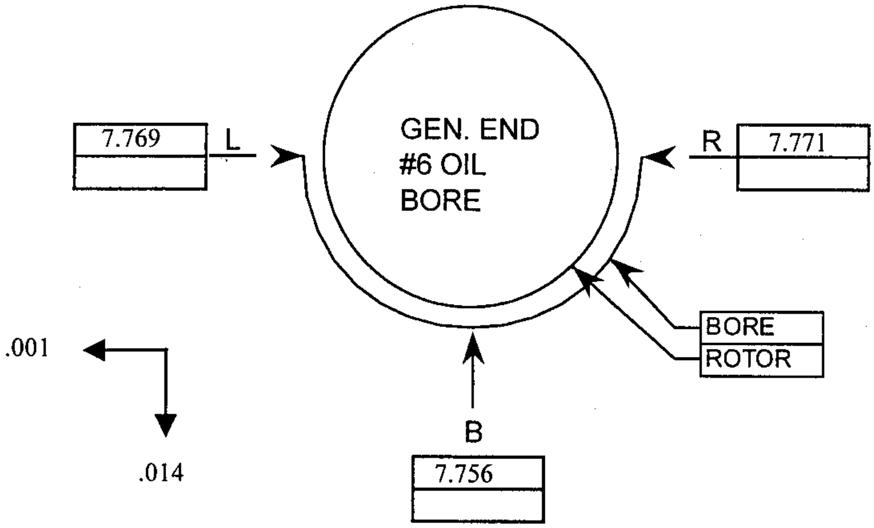
SIEMENS
WESTINGHOUSE

CUSTOMER: AEP
LOCATION/UNIT #: Mitchell #1

LPA OIL BORE READING

BB/FRAME:
JOB NO.:
COMPONENT/S.O.: LPA ROTOR





Tool # Used ______________________ Cal. Due Date __________

As Found ____X______ Reading Taken By: _Brothers, Day & Night Shift_________ Date: __9/8-9/10____

As Assembled __________ Reviewed By (W) Eng.: ______________________ Date: __________

E: HP023.PPT Rev. 01

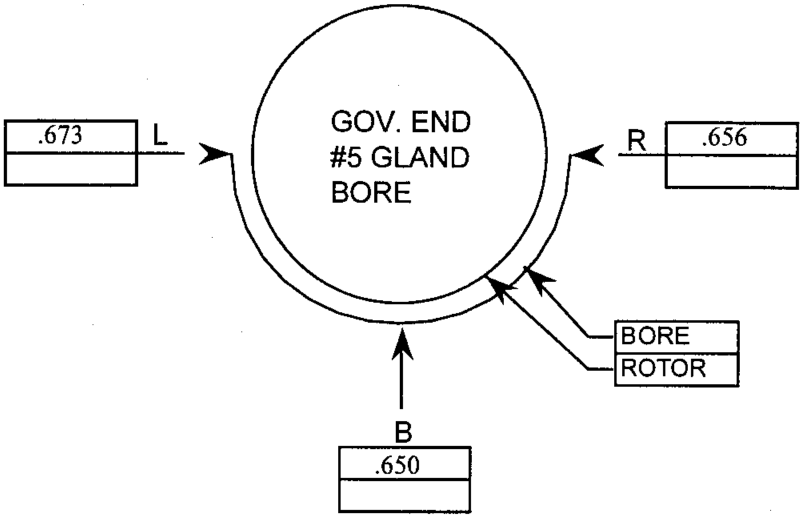
**SIEMENS
WESTINGHOUSE**

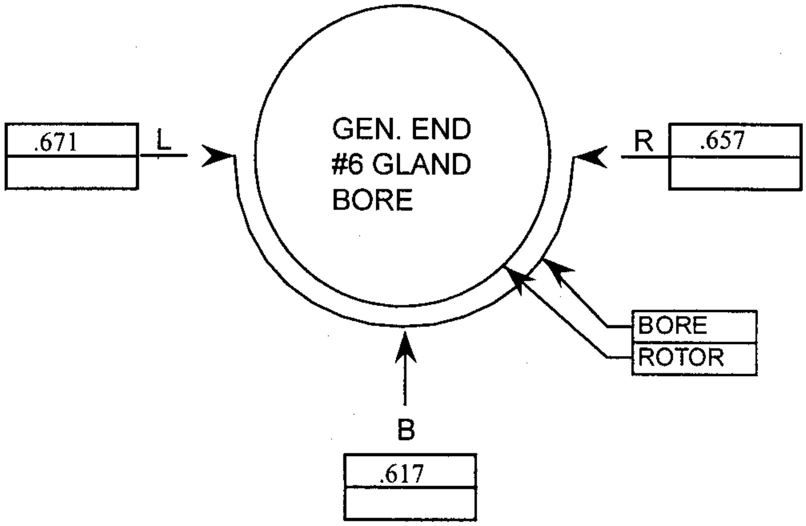
CUSTOMER: AEP
LOCATION/UNIT #: Mitchell #1

LP1 GLAND BORE

BB/FRAME: JOB NO.:
COMPONENT/S.O.: LP1 ROTOR

Rotor # TD35045





Tool # Used ______________ Cal. Due Date ______________

As Found ____X______ Reading Taken By: __G.Rahn______________ Date: __9/11/01________

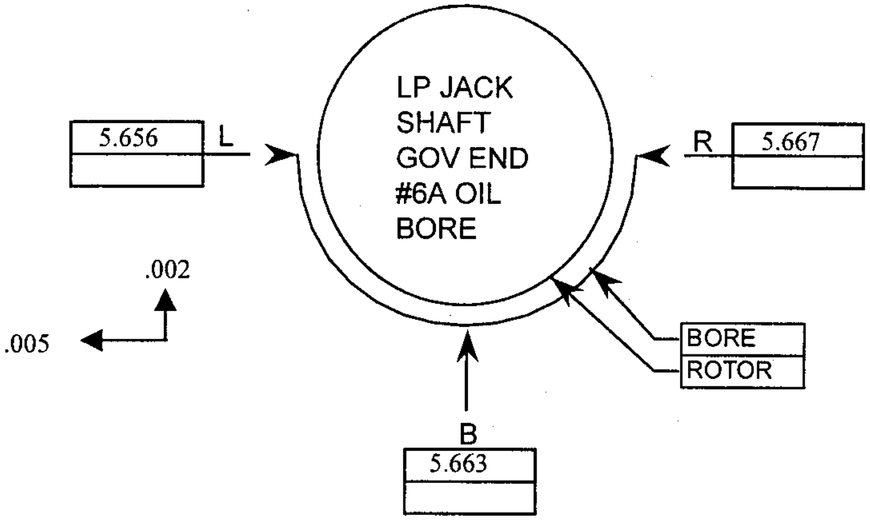
As Assembled ______________ Reviewed By (W) Eng.: ______________ Date: ______________

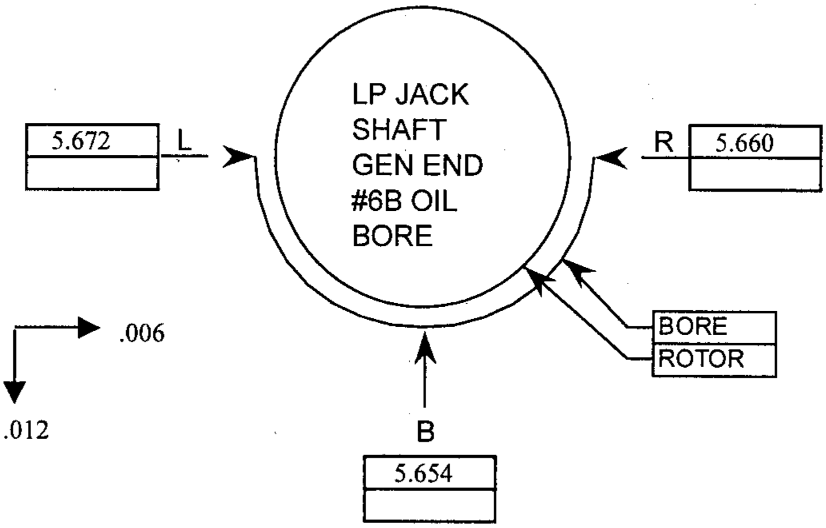
:\ HP023.PPT Rev. 01

SIEMENS
WESTINGHOUSE

CUSTOMER: AEP	
LOCATION/UNIT #: Mitchell #1	
LP JACK SHAFT OIL BORE	
BB/FRAME:	JOB NO.:
COMPONENT/S.O.: LP JACK SHAFT	

Note: readings were recorded with LP jack shaft coupled to LP1 & LP2





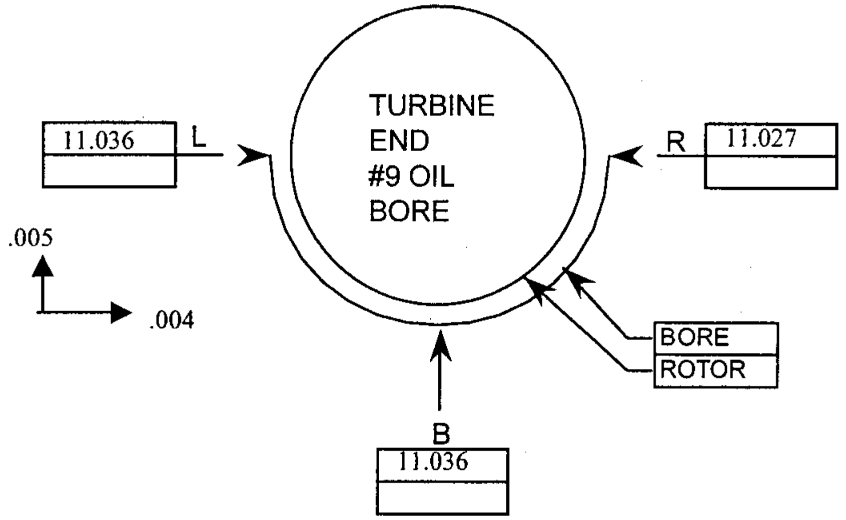
Tool # Used ______________________ Cal. Due Date __________

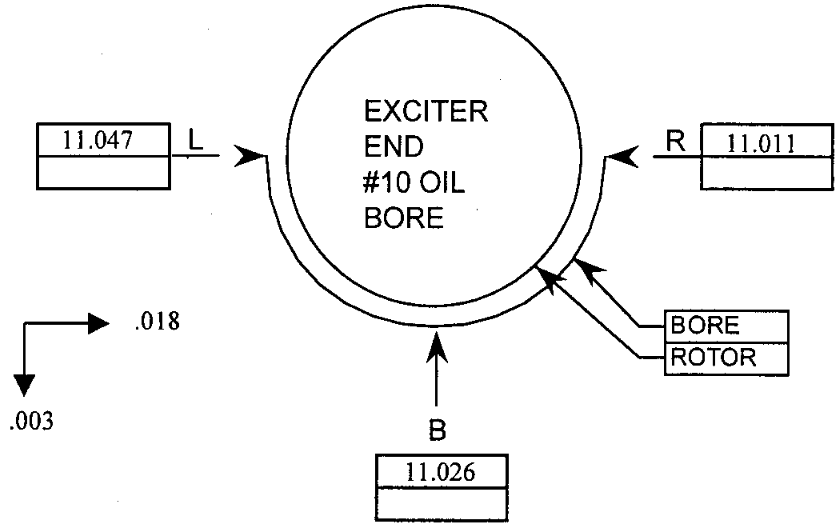
As Found _____X_____ Reading Taken By: ___T.Riba____________________ Date: __9/8-9/10____

As Assembled __________ Reviewed By (W) Eng.: ______________________ Date: __________

SIEMENS
WESTINGHOUSE

CUSTOMER:	AEP		
LOCATION/UNIT #:	Mitchell #1		
GENERATOR OIL BORE			
BB/FRAME:		JOB NO.:	
COMPONENT/S.O.:	GENERATOR		





Tool # Used ______________________ Cal. Due Date __________

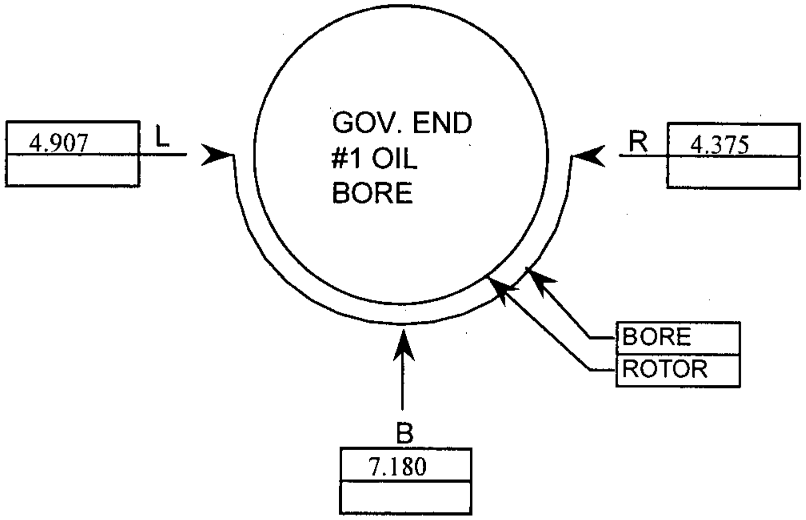
As Found _____X_____ Reading Taken By: ___D.Downing & R.Vickers__________ Date: _9/6/01____

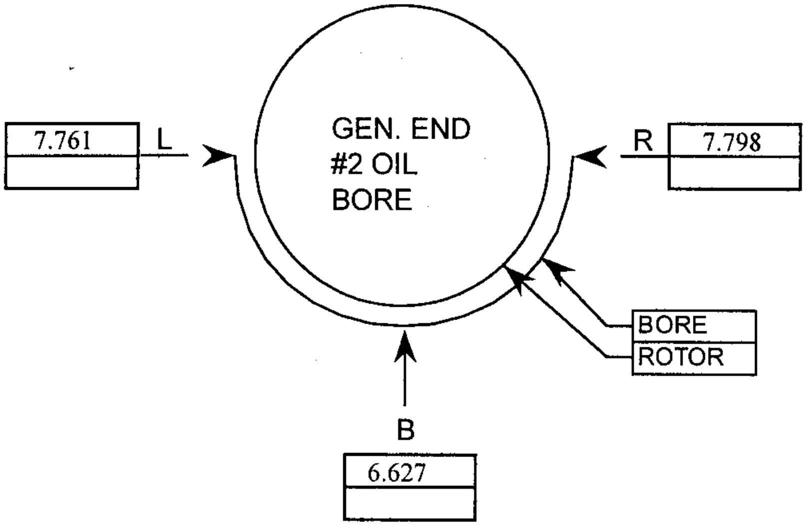
As Assembled __________ Reviewed By (W) Eng.: ______________________ Date: __________

SIEMENS
WESTINGHOUSE

CUSTOMER:	AEP	
LOCATION/UNIT #:	Mitchell #1	
VHP/HP OIL BORE READING		
BB/FRAME:		JOB NO.:
COMPONENT/S.O.:	VHP/HP ROTOR	

Spare rotor # TD35049 Compatibility Data





HP023.PPT Rev. 01

Tool # Used ______________________ Cal. Due Date __________

As Found __________ Reading Taken By: _______Brothers_________________ Date: __9/12/01____

As Charted ____X______ Reviewed By (W) Eng.: ______________________ Date: __________

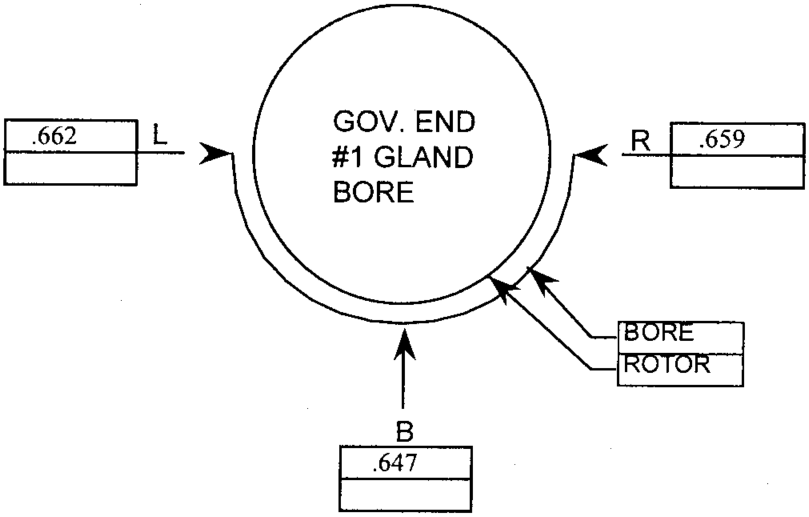
SIEMENS
WESTINGHOUSE

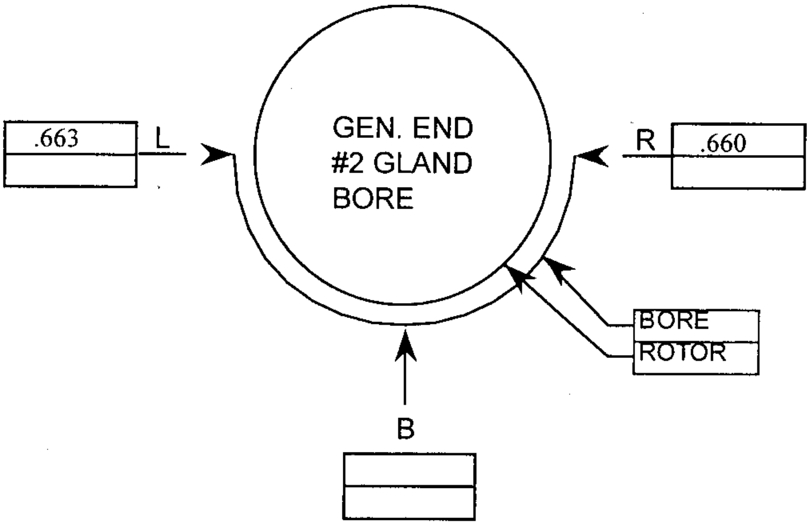
CUSTOMER: AEP
LOCATION/UNIT #: Mitchell #1

VHP/HP GLAND BORE

BB/FRAME: JOB NO.:
COMPONENT/S.O.: VHP/HP ROTOR

Spare rotor # TD35049 Compatibility Data





Tool # Used ______________ Cal. Due Date ________

As Found ________ Reading Taken By: ___Brothers_______ Date: _9/12/01_____

As Charted ________ Reviewed By (W) Eng.: ______________ Date: ________

FILE: HP023.PPT Rev. 01

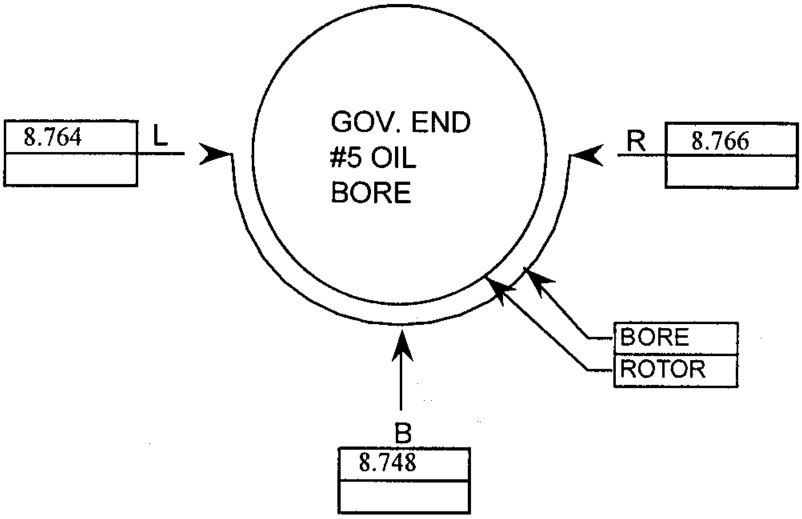
SIEMENS
WESTINGHOUSE

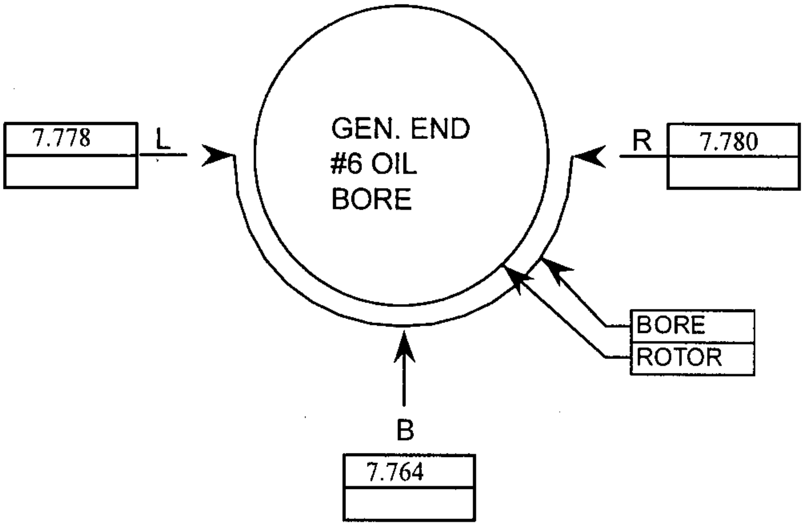
CUSTOMER: AEP
LOCATION/UNIT #: Mitchell #1

LPA OIL BORE READING

BB/FRAME: JOB NO.:
COMPONENT/S.O.: LPA ROTOR

Spare rotor # TD39437
Compatibility Data





Tool # Used ____________ Cal. Due Date ________

As Found ________ Reading Taken By: _Brothers, Night Shift________ Date: __9/12/01____

As Charted ____X______ Reviewed By (W) Eng.: ________________ Date: ________

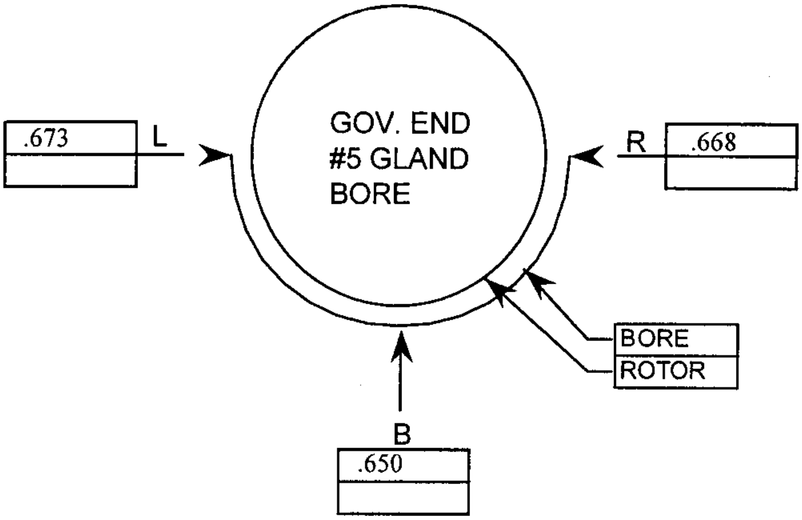
SIEMENS
WESTINGHOUSE

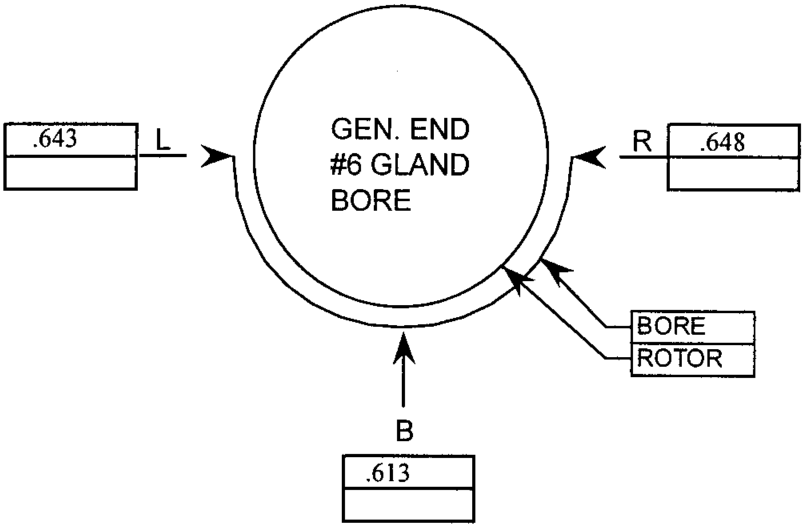
CUSTOMER: AEP
LOCATION/UNIT #: Mitchell #1

LPA OIL BORE READING

BB/FRAME: JOB NO.:
COMPONENT/S.O.: LPA ROTOR

Spare rotor # TD39437
Compatibility Data





Tool # Used ______________________ Cal. Due Date __________

As Found __________ Reading Taken By: _Brothers, Night Shift_________ Date: __9/12/01____

As Charted ____X______ Reviewed By (W) Eng.: ______________________ Date: __________

HP023.PPT Rev. 01

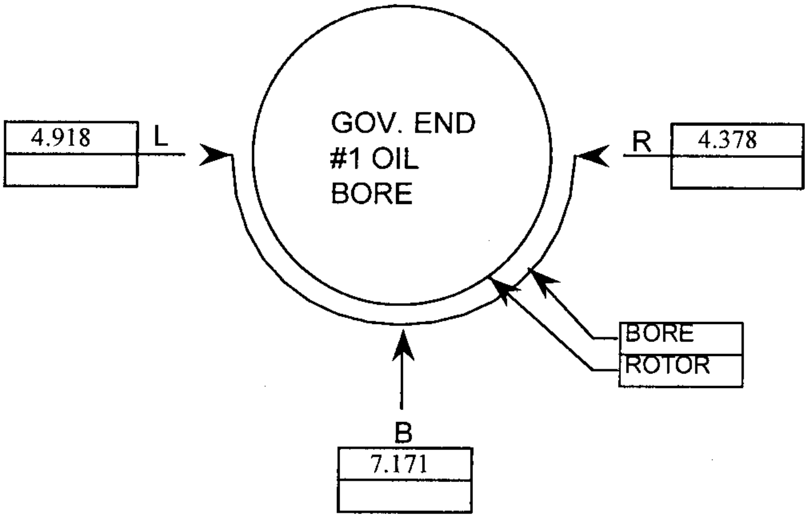
SIEMENS
WESTINGHOUSE

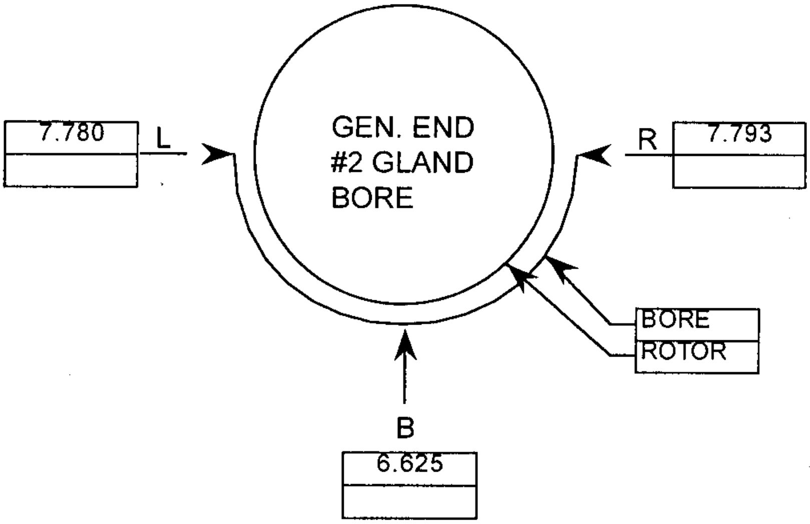
CUSTOMER: AEP
LOCATION/UNIT #: Mitchell #1

VHP/HP GLAND BORE

BB/FRAME: JOB NO.:
COMPONENT/S.O.: VHP/HP ROTOR

Spare rotor # TD35049 Final Data





FILE: HP023.PPT Rev. 01

Tool # Used ____________________ Cal. Due Date __________

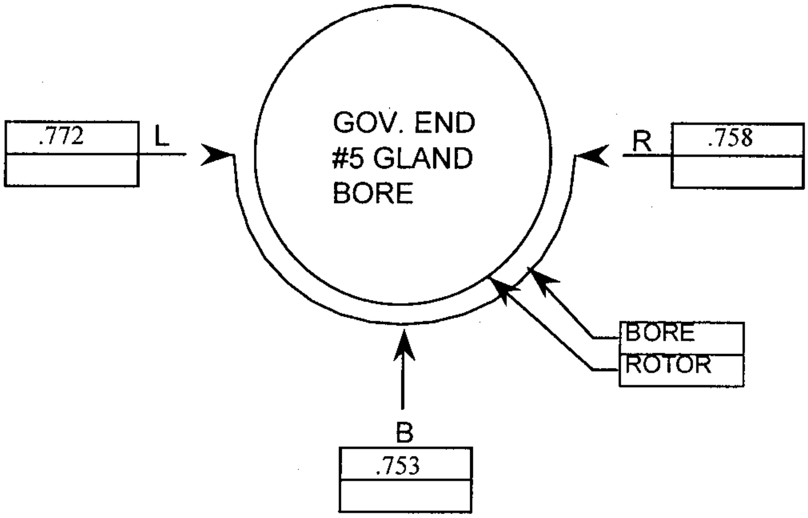
As Found __________ Reading Taken By: ___Brothers________ Date: _10/21/01_____

As Charted ____X______ Reviewed By (W) Eng.: ________________ Date: ____________

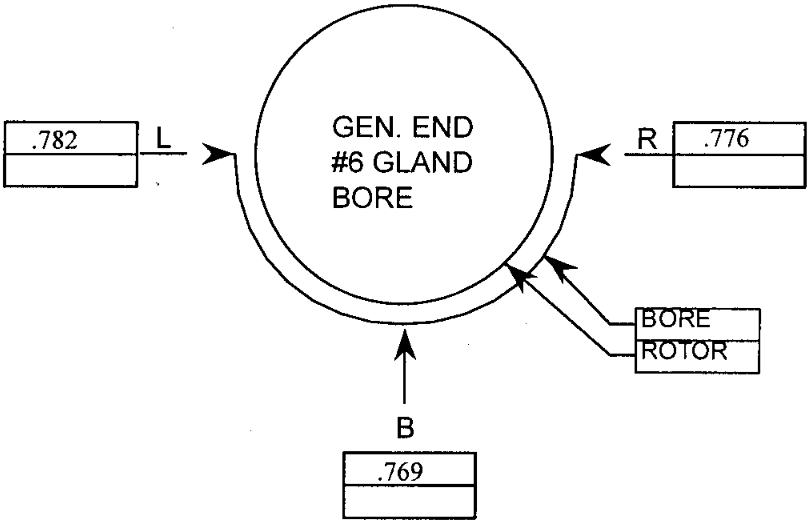
SIEMENS
WESTINGHOUSE

CUSTOMER:	AEP
LOCATION/UNIT #:	Mitchell #1
LP1 GLAND BORE	
BB/FRAME:	JOB NO.:
COMPONENT/S.O.:	LP1 ROTOR

Rotor # TD35045



L .772
R .758
B .753



L .782
R .776
B .769

Tool # Used ______________________ Cal. Due Date __________

As Found __________ Reading Taken By: __G.Rahn______________________ Date: __10/01/01________

As Assembled ____X______ Reviewed By (W) Eng.: ______________________ Date: __________
(Prior to coupling alignment moves)

ILE: HP023.PPT Rev. 01

Coupling Alignment

All of the coupling rabbet fits were miced up for proper interference. All of the coupling bolts and bolt holes were also miced up for clearance. As noted in the LP "A" section of this report, the coupling bolt hole size differences between the IP rotor jackshaft and LP "A" rotor (which is "C" coupling) were off significantly.

There was a spare IP jackshaft made to fit between these IP and LP "A" rotors. The old jackshaft was removed and the new jackshaft was installed. All of the bolts were stretched to Westinghouse specifications. A differential coupling runout was done. All coupling rabbet fit sizes are included in this section.

Coupling alignment checks had to be done on the following couplings: "A", "C", "D", "E", "G", and "H". The definition of each coupling is listed below, along with the design coupling alignment:

"A" coupling TE = HP rotor GE = IP rotor
Design: Rim: Concentric Face: Parallel
"C" coupling TE = jackshaft bolted to IP rotor GE = LP "A" rotor
Design: Rim: IP = 0.0175 low Face: Open 0.004 on bottom
"D" coupling TE = LP "A" rotor GE = LP jackshaft
Design: Rim: Concentric Face: Parallel
"E" coupling TE = LP jackshaft GE = LP "B" rotor
Design: Rim: J.S. = 0.018 low Face: Open 0.006 on bottom
"G" coupling TE = jackshaft bolted to LP B rotor GE = generator
Design: Rim: Gen = 0.0135 low Face: Open 0.010 on bottom
"H" coupling TE = generator GE = collector assy.
Design: Rim: Concentric Face: Parallel

Note 1: "C" coupling is aligned with "B" coupling (IP rotor to small jackshaft) already assembled.
Note 2: "F" coupling (LP "B" rotor to small jackshaft) was never disassembled.
Note 3: The LP jackshaft is aligned using temporary supports as bearings, located at the oil deflector fits. It is aligned as a separate rotor.

LP A rotor was installed first, and sixteen point coupling checks were taken on "C", "D", and "E" rotors. It was determined that "D" and "E" couplings could be aligned moving only the jackshaft plus a small move on T-5 bearing. This left T-6 and both LP B bearings in their as-found position. After the moves were completed, "D" and "E" couplings were assembled, and all bolts were stretched. Differential coupling runouts were checked after the couplings were assembled.

A sixteen point check on "C" coupling showed that the alignment required the IP rotor be moved at both T-3 and T-4 bearings. The T-3 bearing was moved a small amount to correct the alignment, but the move on T-4 bearing was fairly significant.

After the T-3 and T-4 bearings were moved, the radial clearance of the IP outer gland packing was checked. The clearances were concentric within 0.010" at the TE gland packing, but the GE of the IP shell had to be moved down by 0.015" to get even clearances.

The final coupling alignment was checked and "C" coupling was assembled. A differential runout check was done on the coupling and final rotor radial positions were taken.

As noted above, no tightwire readings were taken on T-1 and T-2 bearings. When the HP rotor was installed, the rotor was significantly out of position. This was confirmed by both the wheel clearances and rotor radial position checks. Rather than moving the rotor based on the radial position checks, a preliminary coupling check was done on "A" coupling. Moves were made to T-1 and T-2 bearings that brought "A" coupling within design limits in a tops-off condition. The wheel clearances were acceptable at this time.

The upper half of the shell was assembled and a sixteen point coupling alignment check was done on "A" coupling again. A minor move to T-2 bearing was necessary to align the coupling within tolerances. "A" coupling was assembled and differential runout checks were taken. Radial positions were taken at T-1 and T-2 oil deflector fits. The radial position at T-1 agreed with the tightwire data, but the radial position at T-2 showed that the shell needed to be lowered by 0.010". The HP GE shell arm keys were machined to size and reinstalled.

A sixteen point check was done on "G" coupling. The generator was moved to the right to bring the coupling alignment within tolerance of the design alignment. The generators centerline keys were adjusted to keep the position. The generator hold down bolts were all checked for clearance and torqued. All "G" coupling bolting was stretched to OEM specifications.

The new collector assembly was set in place with the TE still in the shipping skid. An alignment check was done on "H" coupling rolling only the generator shaft. The collector assembly was shimmed for elevation and moved into place. After the alignment was within tolerance, the coupling was assembled and the shipping skid was removed. All coupling bolts were torqued to Westinghouse specifications.

The radial leads were made up under the direction of the Westinghouse service rep. A copper washer was added under both TE sides of the radial leads to allow the proper tightness for the wedges that fit over the radial leads.

The centerline key for the collector was installed and bolted into place. The collector assembly was dowelled into place.

Final coupling checks for all of the couplings (A, C, D, E, G, & H) are included in this section. Final coupling runout checks and final radial positions are included with this section.

Axial Positions

As found outside "L" readings (axial positions) were taken on all of the turbine rotors. After changing out the HP rotor and the LP "A" rotor, the spare rotors were positioned at their best possible "K" readings and new outside "L" readings were taken.

New coupling spacer thicknesses were calculated, machined at CMS, and installed. All outside "L" readings were taken after the spacers were installed and the thrust bearing was built. These readings can be found in this section.

Alignment
Couplings

Plant ML Unit 1 Turbine Serial No. ____

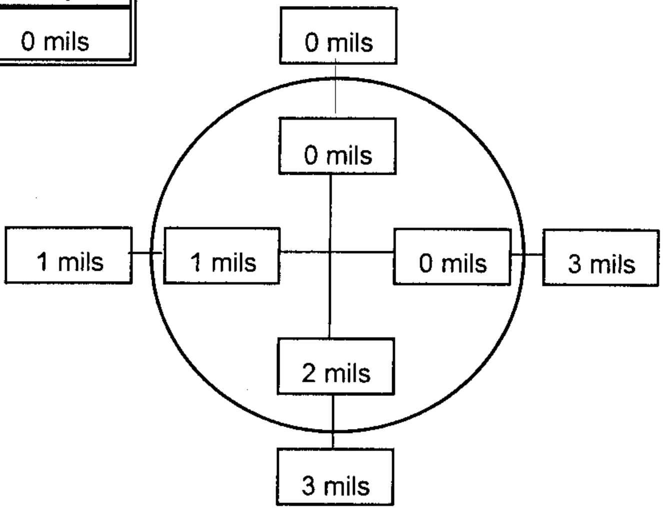
Date 10/27/01 As Found/Final Data Final Prepared by D. Robinson

Coupling A Sweep Diameter ____ Indicator Mounted on HP

Alignment Readings

Position	**Top**	**Left**	**Bottom**	**Right**	**Top**
Rim (Mils)	0 mils	1 mils	3 mils	3 mils	0 mils
Face 0°	1.282"	1.281"	1.281"	1.281"	
Face 90°	1.283"	1.284"	1.285"	1.283"	
Face 180°	1.283"	1.284"	1.285"	1.284"	
Face 270°	1.276"	1.277"	1.279"	1.276"	
Average	1.281"	1.282"	1.283"	1.281"	
Relative	0 mils	1 mils	2 mils	0 mils	

Check	**Face**	**Rim**
Top + Bottom=	2 mils	3 mils
Right + Left =	1 mils	4 mils
Difference=	1 mils	-1 mils



Rim Recheck (If Necessary)

Position	**Top**	**Left**	**Bottom**	**Right**	**Top**
Rim (Mils)					

Comments:	

Alignment
Couplings

Plant ML Unit 1 Turbine Serial No. ______

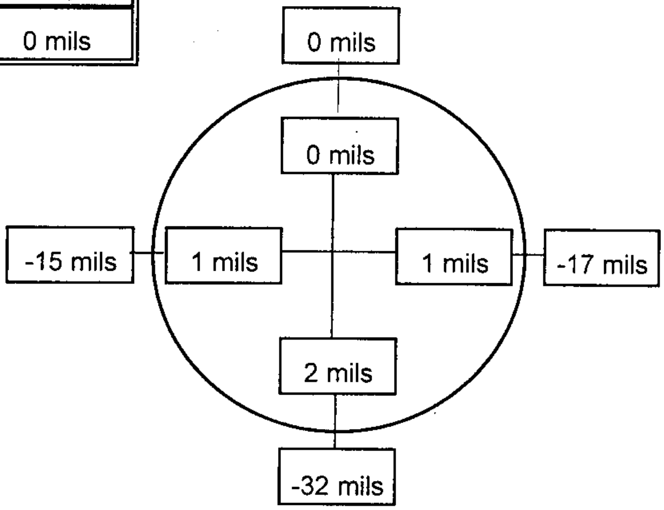
Date 10/23/01 As Found/Final Data Final Prepared by D. Bordenkircher

Coupling C Sweep Diameter ______ Indicator Mounted on IP

Alignment Readings

Position	**Top**	**Left**	**Bottom**	**Right**	**Top**
Rim (Mils)	0 mils	-15 mils	-32 mils	-17 mils	0 mils
Face 0º	1.059"	1.060"	1.063"	1.062"	
Face 90º	1.058"	1.062"	1.063"	1.059"	
Face 180º	1.060"	1.061"	1.060"	1.059"	
Face 270º	1.053"	1.053"	1.053"	1.054"	
Average	1.058"	1.059"	1.060"	1.059"	
Relative	0 mils	1 mils	2 mils	1 mils	

Check	**Face**	**Rim**
Top + Bottom=	2 mils	-32 mils
Right + Left =	2 mils	-32 mils
Difference=	0 mils	0 mils



Rim Recheck (If Necessary)

Position	**Top**	**Left**	**Bottom**	**Right**	**Top**
Rim (Mils)					

Comments:

Alignment
Couplings

Plant ML Unit 1 Turbine Serial No. ______

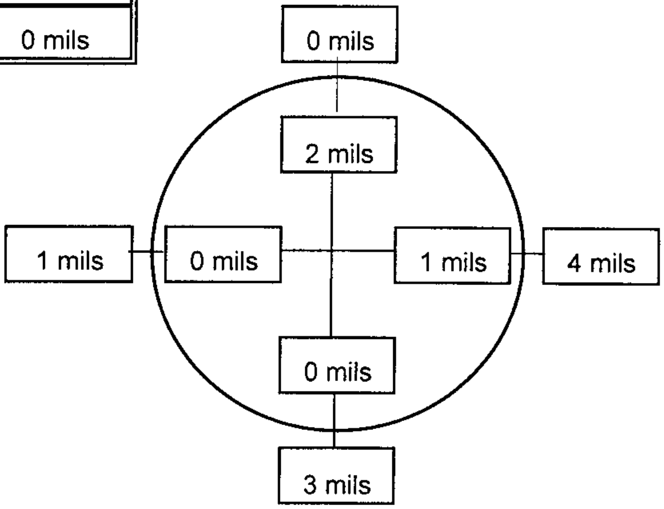
Date 10/18/01 As Found/Final Data Final Prepared by Doug Foster

Coupling D Sweep Diameter 38.0 " Indicator Mounted on LP A

Alignment Readings

Position	**Top**	**Left**	**Bottom**	**Right**	**Top**
Rim (Mils)	0 mils	1 mils	3 mils	4 mils	0 mils
Face 0°	0.568"	0.567"	0.567"	0.567"	
Face 90°	0.504"	0.500"	0.500"	0.500"	
Face 180°	0.608"	0.605"	0.604"	0.608"	
Face 270°	0.606"	0.605"	0.606"	0.606"	
Average	0.5715"	0.5693"	0.5693"	0.5703"	
Relative	0.0 mils	-2.2 mils	-2.2 mils	-1.2 mils	

Check	**Face**	**Rim**
Top + Bottom=	-2.2 mils	3.0 mils
Right + Left =	-3.4 mils	5.0 mils
Difference=	1.2 mils	-2.0 mils



Rim Recheck (If Necessary)

Position	**Top**	**Left**	**Bottom**	**Right**	**Top**
Rim (Mils)					

Comments:

Alignment
Couplings

Plant ML Unit 1 Turbine Serial No.

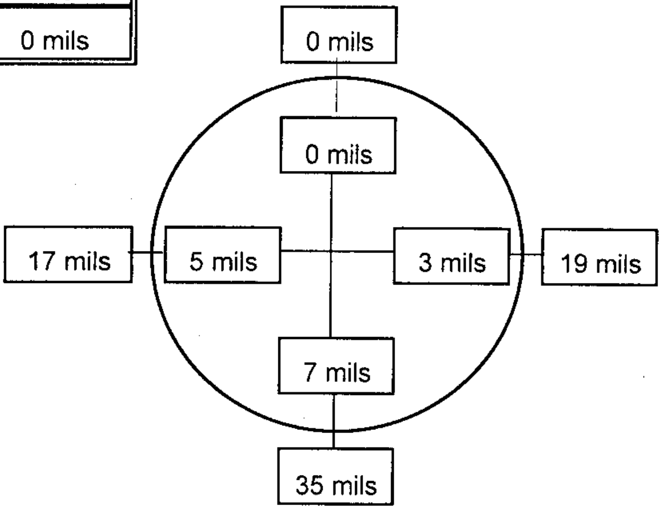
Date 10/18/01 As Found/Final Data Final Prepared by Doug Foster

Coupling E Sweep Diameter 38.0 " Indicator Mounted on LP B

Alignment Readings

Position	Top	Left	Bottom	Right	Top
Rim (Mils)	0 mils	17 mils	35 mils	19 mils	0 mils
Face 0°	0.610"	0.615"	0.616"	0.613"	
Face 90°	0.610"	0.613"	0.616"	0.612"	
Face 180°	0.596"	0.602"	0.604"	0.600"	
Face 270°	0.557"	0.561"	0.564"	0.560"	
Average	0.593"	0.598"	0.600"	0.596"	
Relative	0 mils	5 mils	7 mils	3 mils	

Check	Face	Rim
Top + Bottom=	7 mils	35 mils
Right + Left =	8 mils	36 mils
Difference=	-1.0 mils	-1.0 mils



Rim Recheck (If Necessary)

Position	Top	Left	Bottom	Right	Top
Rim (Mils)					

Comments:

Alignment
Couplings

Plant ML Unit 1 Turbine Serial No. ____

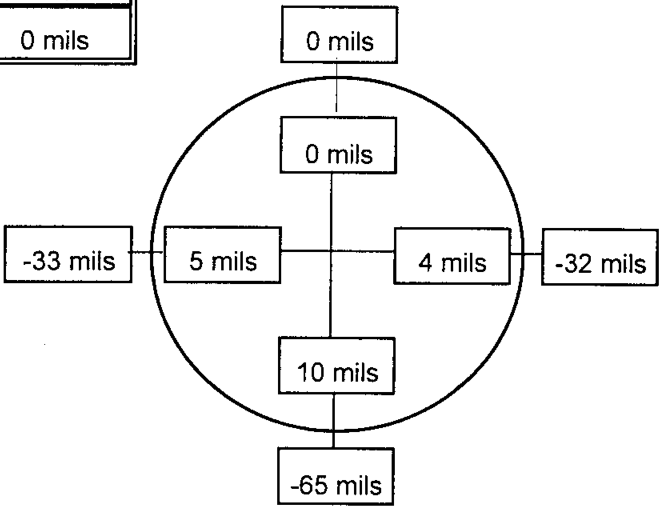
Date 10/18/01 As Found/Final Data Final Prepared by R. Vickers

Coupling G Sweep Diameter 38.0 " Indicator Mounted on LP

Alignment Readings

Position	**Top**	**Left**	**Bottom**	**Right**	**Top**
Rim (Mils)	0 mils	-33 mils	-65 mils	-32 mils	0 mils
Face 0°	4.329"	4.336"	4.342"	4.335"	
Face 90°	4.311"	4.318"	4.321"	4.314"	
Face 180°	4.313"	4.317"	4.321"	4.317"	
Face 270°	4.310"	4.314"	4.321"	4.315"	
Average	4.316"	4.321"	4.326"	4.320"	
Relative	0 mils	5 mils	10 mils	4 mils	

Check	**Face**	**Rim**
Top + Bottom=	10 mils	-65 mils
Right + Left =	9 mils	-65 mils
Difference=	1 mils	0 mils



Rim Recheck (If Necessary)

Position	**Top**	**Left**	**Bottom**	**Right**	**Top**
Rim (Mils)					

Comments:

Alignment
Couplings

Plant ML
Unit 1
Turbine Serial No.

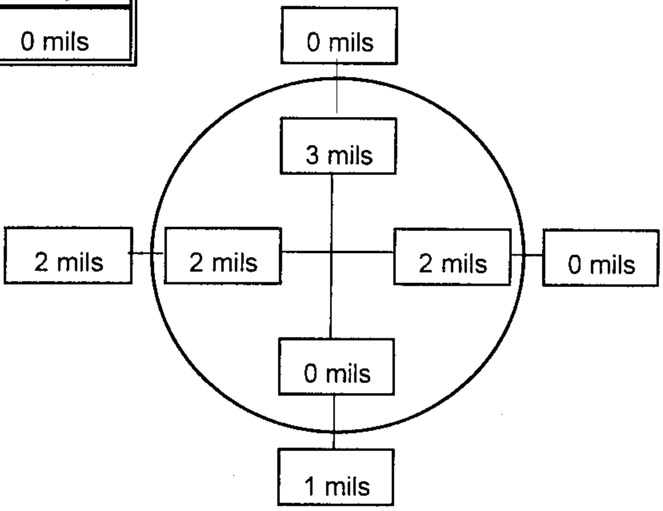
Date 10/22/01
As Found/Final Data Final
Prepared by B Haglock

Coupling H
Sweep Diameter
Indicator Mounted on Gen

Alignment Readings

Position	Top	Left	Bottom	Right	Top
Rim (Mils)	0 mils	2 mils	1 mils	0 mils	0 mils
Face 0°	0.420"	0.419"	0.417"	0.420"	
Face 90°	0.422"	0.419"	0.419"	0.421"	
Face 180°	0.424"	0.423"	0.420"	0.423"	
Face 270°	0.425"	0.425"	0.424"	0.425"	
Average	0.423"	0.422"	0.420"	0.422"	
Relative	0 mils	-1 mils	-3 mils	-1 mils	

Check	Face	Rim
Top + Bottom=	-3 mils	1 mils
Right + Left =	-2 mils	2 mils
Difference=	-1 mils	-1 mils



Rim Recheck (If Necessary)

Position	Top	Left	Bottom	Right	Top
Rim (Mils)					

Comments:	

Coupling Assembly Checks

Plant & Unit Mitchell Unit 1

Prepared by T. Fankhauser

Date(m/d/y) 10/29/01

As Found / Final Data Final

Turbine S/N:

Coupling A

Data Final
(as found/final)

TE = HP Rotor
GE = IP rotor

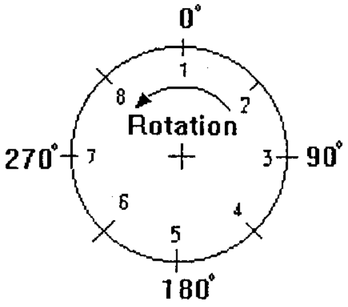


Fig. 1.

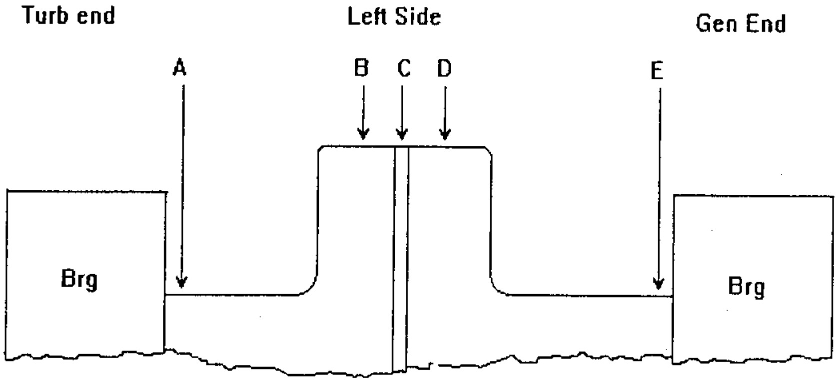


Fig. 2.

Coupling Runouts

(Readings are in Mils)

Area Indicated		Position Number								
		1 0°	2 45°	3 90°	4 135°	5 180°	6 225°	7 270°	8 315°	1 0°
TE Journal	A									
TE Cplg. Periphery B	B	0.0	1.5	2.0	1.0	-1.0	-2.0	-2.0	-1.0	0.0
Spacer	C	0.0	-2.0	-2.0	0.0	0.0	1.5	1.5	1.0	0.0
GE Cplg. Periphery D	D	0.0	-1.5	-1.0	-0.5	-1.5	0.0	0.0	0.0	-1.0
GE Journal	E									

Differential Runouts

Journals	A-E									
Cplg. Periphery	B-D	0.0	3.0	3.0	1.5	0.5	2.0	2.0	1.0	1.0
Spacer to Cplg	C-B	0.0	3.5	4.0	1.0	1.0	3.5	3.5	2.0	0.0
Spacer to Cplg	C-D	0.0	0.5	1.0	0.5	1.5	1.5	1.5	1.0	1.0

Maximum Runouts

Area Indicated		Data Check	TIR Runout	TIR Check
TE Journal	A			
TE Cplg. Periphery B	B	OK	4.0	
Spacer	C	OK	3.5	
GE Cplg. Periphery D	D	OK	1.5	
GE Journal	E			

Maximum Differential Runouts

		Max. Diff.	Diff. Check
Journals	A-E		
Cplg. Periphery	B-D	3.0	
Spacer to Cplg	C-B	4.0	
Spacer to Cplg	C-D	1.5	

Coupling Assembly Checks

Plant & Unit Mitchell Unit 1

Prepared by J Foster

Date(m/d/y) 10/22/01

As Found / Final Data Final

Turbine S/N:

Coupling C

Data Final
(as found/final)

TE = IP Jackshaft
GE = LP "A" rotor

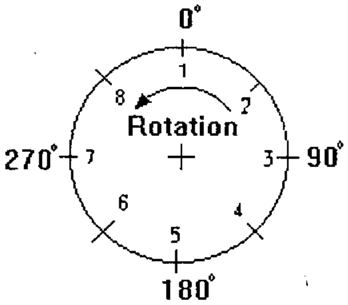


Fig. 1.

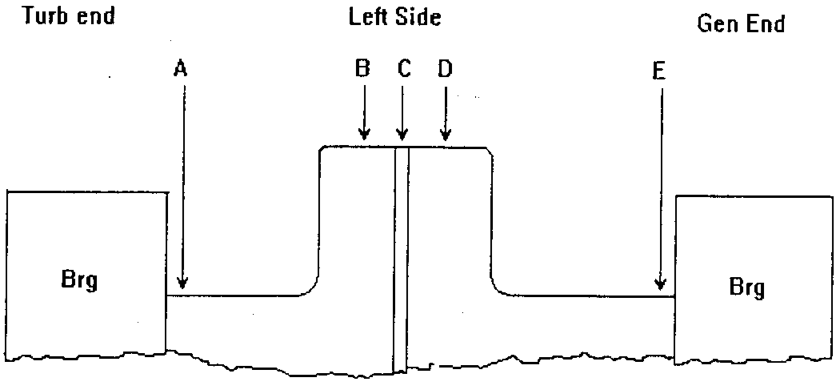


Fig. 2.

Coupling Runouts

(Readings are in Mils)

Area Indicated		Position Number								
		1	2	3	4	5	6	7	8	1
		0°	45°	90°	135°	180°	225°	270°	315°	0°
TE Journal	A									
TE Cplg. Periphery B	B	0.0	1.0	1.0	-1.0	-2.0	-3.0	-2.0	-1.0	0.0
Spacer	C	0.0	2.0	2.0	0.0	-1.0	-3.0	-3.0	-2.0	0.0
GE Cplg. Periphery D	D	0.0	0.0	0.0	-1.0	-2.0	-3.0	-3.0	-2.0	-1.0
GE Journal	E									

Differential Runouts

Journals	A-E									
Cplg. Periphery	B-D	0.0	1.0	1.0	0.0	0.0	0.0	1.0	1.0	1.0
Spacer to Cplg	C-B	0.0	1.0	1.0	1.0	1.0	0.0	1.0	1.0	0.0
Spacer to Cplg	C-D	0.0	2.0	2.0	1.0	1.0	0.0	0.0	0.0	1.0

Maximum Runouts

Area Indicated		Data Check	TIR Runout	TIR Check
TE Journal	A			
TE Cplg. Periphery B	B	OK	4.0	
Spacer	C	OK	5.0	
GE Cplg. Periphery D	D	OK	3.0	
GE Journal	E			

Maximum Differential Runouts

		Max. Diff.	Diff. Check
Journals	A-E		
Cplg. Periphery	B-D	1.0	
Spacer to Cplg	C-B	1.0	
Spacer to Cplg	C-D	2.0	

Coupling Assembly Checks

Plant & Unit Mitchell Unit 1 Prepared by J Foster

Date(m/d/y) 10/20/01 As Found / Final Data Final Turbine S/N:

Coupling D

Data Final
(as found/final)

TE = LP "A" Rotor
GE = LP Jackshaft

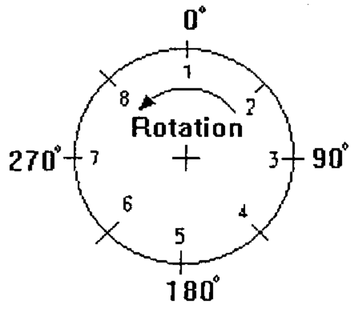


Fig. 1.

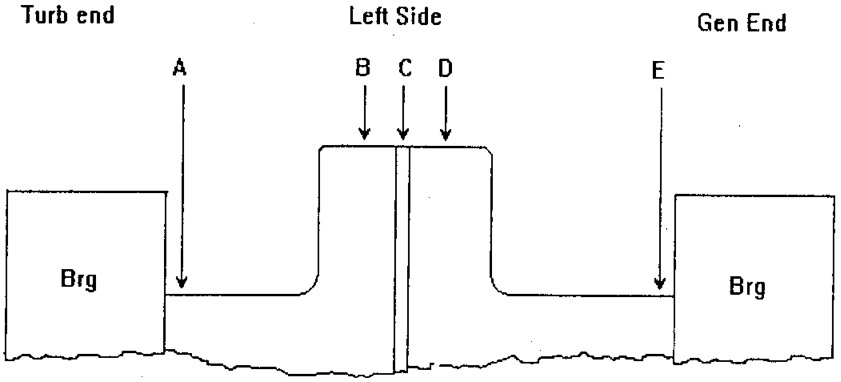


Fig. 2.

Coupling Runouts (Readings are in Mils)

		Position Number								
Area Indicated		**1** **0°**	**2** **45°**	**3** **90°**	**4** **135°**	**5** **180°**	**6** **225°**	**7** **270°**	**8** **315°**	**1** **0°**
TE Journal	**A**									
TE Cplg. Periphery B	**B**	0.0	-1.0	0.0	1.0	0.0	1.0	2.0	1.0	0.0
Spacer	**C**	0.0	0.0	1.0	1.0	1.0	1.0	1.0	0.0	0.0
GE Cplg. Periphery D	**D**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
GE Journal	**E**									

Differential Runouts

Journals	**A-E**									
Cplg. Periphery	**B-D**	0.0	1.0	0.0	1.0	0.0	1.0	2.0	1.0	0.0
Spacer to Cplg	**C-B**	0.0	1.0	1.0	0.0	1.0	0.0	1.0	1.0	0.0
Spacer to Cplg	**C-D**	0.0	0.0	1.0	1.0	1.0	1.0	1.0	0.0	0.0

Maximum Runouts

Area Indicated		**Data Check**	**TIR Runout**	**TIR Check**
TE Journal	**A**			
TE Cplg. Periphery B	**B**	OK	3.0	
Spacer	**C**	OK	1.0	
GE Cplg. Periphery D	**D**	OK	0.0	
GE Journal	**E**			

Maximum Differential Runouts

		Max. Diff.	**Diff. Check**
Journals	**A-E**		
Cplg. Periphery	**B-D**	2.0	
Spacer to Cplg	**C-B**	1.0	
Spacer to Cplg	**C-D**	1.0	

Coupling Assembly Checks

Plant & Unit Mitchell Unit 1

Prepared by J Foster

Date(m/d/y) 10/20/01

As Found / Final Data Final

Turbine S/N:

Coupling E

Data Final
(as found/final)

TE = LP Jackshaft
GE = LP "B" Rotor

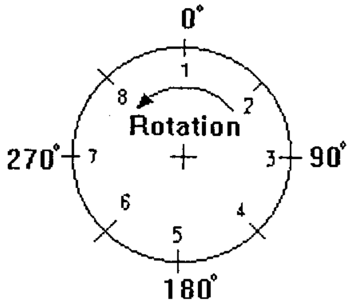


Fig. 1.

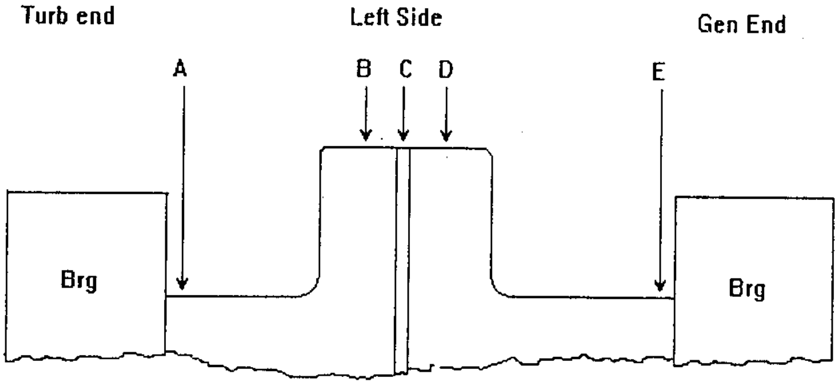


Fig. 2.

Coupling Runouts

(Readings are in Mils)

		Position Number								
		1	2	3	4	5	6	7	8	1
Area Indicated		0°	45°	90°	135°	180°	225°	270°	315°	0°
TE Journal	**A**									
TE Cplg. Periphery B	**B**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Spacer	**C**	0.0	0.0	1.0	1.0	0.5	1.0	0.0	0.0	0.0
GE Cplg. Periphery D	**D**	0.0	0.0	0.0	-1.0	-1.0	-0.5	-0.5	0.0	0.0
GE Journal	**E**									

Differential Runouts

Journals	**A-E**									
Cplg. Periphery	**B-D**	0.0	0.0	0.0	1.0	1.0	0.5	0.5	0.0	0.0
Spacer to Cplg	**C-B**	0.0	0.0	1.0	1.0	0.5	1.0	0.0	0.0	0.0
Spacer to Cplg	**C-D**	0.0	0.0	1.0	2.0	1.5	1.5	0.5	0.0	0.0

Maximum Runouts

Area Indicated		**Data Check**	**TIR Runout**	**TIR Check**
TE Journal	**A**			
TE Cplg. Periphery B	**B**	OK	0.0	
Spacer	**C**	OK	1.0	
GE Cplg. Periphery D	**D**	OK	1.0	
GE Journal	**E**			

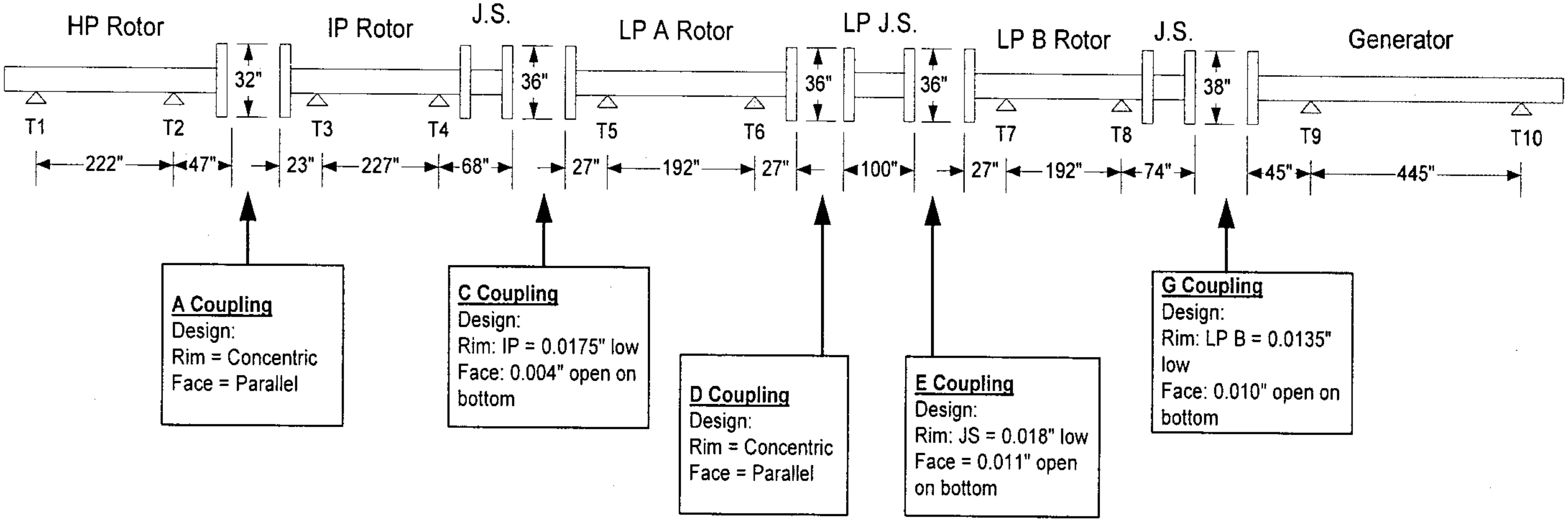
Maximum Differential Runouts

		Max. Diff.	**Diff. Check**
Journals	**A-E**		
Cplg. Periphery	**B-D**	1.0	
Spacer to Cplg	**C-B**	1.0	
Spacer to Cplg	**C-D**	2.0	

Mitchell Unit 1

Coupling alignment data - Fall 2001 Outage

By: John Lackner



A Coupling
Design:
Rim = Concentric
Face = Parallel

C Coupling
Design:
Rim: IP = 0.0175" low
Face: 0.004" open on bottom

D Coupling
Design:
Rim = Concentric
Face = Parallel

E Coupling
Design:
Rim: JS = 0.018" low
Face = 0.011" open on bottom

G Coupling
Design:
Rim: LP B = 0.0135" low
Face: 0.010" open on bottom

SIEMENS
WESTINGHOUSE

CUSTOMER: AEP

LOCATION/UNIT #: MITCHELL # 1

COUPLING & SPACER SPIGOT FIT

BB/FRAME: JOB NO.:

COMPONENT/S.O.: DWG.:

Reading was recorded on spare HP rotor TD35049, spare LP1 TD39437, spare generator rotor S/N79P030 and new collector

Control Rotor	7.500 male fit	7.500	
Spare HP gov end	7.499 female fit	7.499	
TD 35049			.001 interference
Spare HP gen end	19.999 male fit	19.999	
TD 35049			.001 clearance
HP-IP spacer gov end	20.000 Female fit	20.000	
IP JS gen end	21.999 male fit	21.999	
			.001 clearance
IPJS-LP1 spacer gov	20.000 Female fit	22.000	
IPJS-LP1 spacer gen	21.999 female fit	21.999	
			.000 clearance
spare LP1 gov end	21.999 male fit	21.999	
TD 39437			
spare LP1 gen end	21.999 female fit	21.999	
TD 39437			
			.001 clearance
Long JS gov end	21.998 male fit	21.998	
Bull gear gen end	20.000 male fit	20.000	
			.000 clearance
spare generator gov	20.000 Female fit	20.000	
end S/N79P030			
spare generator gen	15.000 male fit	15.000	
end S/N79P030			
New collector	14.997 female fit	14.997	
			.003 interference

As Found ___ Reading Taken By: _D. Robinson_ Date: _9/17/01__

As Charted __X__ Reviewed By (W) Eng.: __________ Date: ____

FILE: MS007.PPT REV 01 & CH1

SIEMENS
WESTINGHOUSE

CUSTOMER: AEP
LOCATION/UNIT #: MITCHELL # 1

COUPLING BOLT & HOLE DIAMETER

BB/FRAME: JOB NO.:
COMPONENT/S.O.: DWG.:

Data for spare HP rotor TD35049 to HP-IP coupling spacer

BOLT NUMBER	Spare HP rotor "A" coupling bolt hole diameter	"A" coupling spacer bolt hole diameter	"A" coupling bolt diameter	IP Rotor "A" coupling hole diameter
1	2.127	2.192	2.123	2.136
2	2.1275	2.213	2.124	2.131
3	2.1275	2.214	2.123	2.129
4	2.1275	2.220	2.123	2.126
5	2.1275	2.225	2.124	2.130
6	2.128	2.215	2.121	2.129
7	2.126	2.184	2.123	2.133
8	2.126	2.188	2.123	2.127
9	2.1265	2.206	2.123	2.131
10	2.1265	2.176	2.123	2.130
11	2.128	2.182	2.123	2.127
12	2.127	2.183	2.123	2.129
13	2.128	2.186	2.122	2.130
14	2.1275	2.196	2.124	2.129
15	2.127	2.174	2.124	2.127
16	2.128	2.202	2.123	2.129

FILE: MS007.PPT REV 01 & CH1

As Found ___ Reading Taken By: _Day & Night Shift_ Date: _9/19/01__

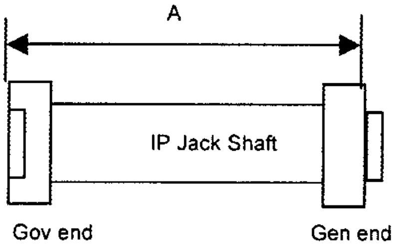
As Assembled __X__ Reviewed By (W) Eng.: __________ Date: ____

SIEMENS
WESTINGHOUSE

CUSTOMER: AEP
LOCATION/UNIT #: MITCHELL # 1

COUPLING BOLT & HOLE DIAMETER

BB/FRAME: JOB NO.:
COMPONENT/S.O.: DWG.:



Data for the Spare IP Jack Shaft to LP "A" rotor.

BOLT NUMBER	Spare IP jack shaft "B" coupling bolt hole diameter	Spare IP jackshaft "C" coupling bolt hole diameter	Spare IP Jackshaft "C" coupling bolt diameter	Spare LP "A" Rotor "C" coupling bolt hole diameter
1	2.126	2.310	2.313	2.317
2	2.126	2.310	2.314	2.313
3	2.126	2.309	2.313	2.314
4	2.127	2.310	2.313	2.316
5	2.126	2.309	2.313	2.313
6	2.126	2.310	2.314	2.313
7	2.126	2.310	2.314	2.310
8	2.126	2.310	2.314	2.314
9	2.126	2.310	2.314	2.311
10	2.126	2.309	2.314	2.312
11	2.126	2.310	2.313	2.314
12	2.126	2.310	2.313	2.312
13	2.127	2.310	2.313	2.318
14	2.126	2.310	2.314	2.311
15	2.126	2.309	2.314	2.314
16	2.126	2.309	2.314	2.315
17		2.310	2.314	2.315
18		2.310	2.315	2.315
19		2.310	2.313	2.315
20		2.307	2.313	2.315

FILE: MS007.PPT REV 01 & CH1

As Found ___ Reading Taken By: __Night Shift Date: _9/20/01__

As Assembled __X__ Reviewed By (W) Eng.: __________ Date: ____

SIEMENS
WESTINGHOUSE

CUSTOMER: AEP
LOCATION/UNIT #: MITCHELL # 1

COUPLING BOLT & HOLE DIAMETER

BB/FRAME: JOB NO.:
COMPONENT/S.O.: DWG.:

Data for LP A Rotor (TD 39437) to LP Jack Shaft

BOLT NUMBER	Spare LP "A" rotor "D" coupling bolt hole diameter	LP Jack shaft "D" coupling bolt hole diameter	"D" coupling bolt diameter
1	2.313	2.314	2.309
2	2.313	2.314	2.309
3	2.313	2.314	2.308
4	2.313	2.314	2.309
5	2.313	2.314	2.309
6	2.313	2.314	2.310
7	2.313	2.314	2.310
8	2.313	2.314	2.310
9	2.313	2.313	2.309
10	2.312	2.314	2.309
11	2.312	2.314	2.310
12	2.313	2.314	2.310
13	2.313	2.314	2.309
14	2.313	2.314	2.310
15	2.313	2.314	2.309
16	2.311	2.314	2.309
17	2.312	2.314	2.309
18	2.312	2.314	2.310
19	2.312	2.314	2.310
20	2.312	2.314	2.310

FILE: MS007.PPT REV 01 & CH1

As Found ___
Reading Taken By: _D. Robinson
Date: _9/18/01__

As Charted __X__
Reviewed By (W) Eng.: __________
Date: ____

SIEMENS
WESTINGHOUSE

CUSTOMER: AEP
LOCATION/UNIT #: MITCHELL # 1

COUPLING BOLT & HOLE DIAMETER

BB/FRAME: JOB NO.:
COMPONENT/S.O.: DWG.:

Data for spare generator (S/N 79P030) to LP "B" rotor bull gear

BOLT NUMBER	LP "B" rotor bull gear "G" coupling bolt hole diameter	Spare generator rotor "G" coupling bolt hole diameter	"G" coupling bolt diameter
1	2.312	2.311	2.307
2	2.312	2.312	2.309
3	2.313	2.311	2.307
4	2.313	2.311	2.308
5	2.312	2.310	2.307
6	2.312	2.310	2.308
7	2.313	2.310	2.308
8	2.312	2.303	2.306
9	2.312	2.310	2.308
10	2.313	2.310	2.309
11	2.313	2.309	2.308
12	2.314	2.310	2.306
13	2.314	2.311	2.309
14	2.314	2.311	2.308
15	2.313	2.312	2.307
16	2.313	2.313	2.308
17	2.314	2.312	2.306
18	2.313	2.310	2.306
19	2.313	2.311	2.305
20	2.314	2.311	2.306
21	2.313	2.312	2.310
22	2.313	2.312	2.305
23	2.313	2.310	2.306
24	2.312	2.311	2.307

As Found ___
Reading Taken By: __Robinson
Date: _9/18/01__

As Assembled ___X_
Reviewed By (W) Eng.: __________
Date: ____

FILE: MS007.PPT REV 01 & CH1

SIEMENS
Westinghouse

CUSTOMER: AEP
LOCATION/UNIT #: MITCHELL #1

COUPLING BOLT STRETCH CHART

BB/FRAME: JOB NO.:
COMPONENT/S.O.: "C" COUPLING DWG.:

"C" COUPLING - IP JACK SHAFT TO LP1 GOV END

BOLT NO.	DIA.	FREE LENGHT	REQ'D STRETCH	COLD MIC. MEAS.	COLD PULL MIC. READING	FLATS TO TURN NUT	HOT STRETCH	TOTAL STRTCH	FLATS TO CORRECT	FINAL MEAS.	FINCH STRETCH
1	2	12.00	0.013	0.811	0.824			0.013			
2	2	12.00	0.013	0.803	0.816			0.013			
3	2	12.00	0.013	0.839	0.853			0.014			
4	2	12.00	0.013	0.792	0.804			0.012			
5	2	12.00	0.013	0.813	0.825			0.012			
6	2	12.00	0.013	0.812	0.825			0.013			
7	2	12.00	0.013	0.810	0.823			0.013			
8	2	12.00	0.013	0.807	0.820			0.013			
9	2	12.00	0.013	0.807	0.820			0.013			
10	2	12.00	0.013	0.753	0.766			0.013			
11	2	12.00	0.013	0.806	0.819			0.013			
12	2	12.00	0.013	0.817	0.830			0.013			
13	2	12.00	0.013	0.819	0.832			0.013			
14	2	12.00	0.013	0.812	0.825			0.013			
15	2	12.00	0.013	0.858	0.871			0.013			
16	2	12.00	0.013	0.804	0.817			0.013			
17	2	12.00	0.013	0.811	0.825			0.014			
18	2	12.00	0.013	0.827	0.839			0.012			
19	2	12.00	0.013	0.822	0.835			0.013			
20	2	12.43	0.013	0.832	0.845			0.013			

Tool # Used ______________________________ Cal. Due Date __________

As Found __________ Reading Taken By: _ Date: ______

As Assembled ___X_______ Reviewed By (W) Eng.: ______ Date: ____

FILE , PPT Rev. 00

SIEMENS
Westinghouse

CUSTOMER: AEP
LOCATION/UNIT #: MITCHELL #1

COUPLING BOLT STRETCH CHART

BB/FRAME: JOB NO.:
COMPONENT/S.O.: "D" COUPLING DWG.:

"D" COUPLING - LP1 GEN END TO JACK SHAFT

BOLT NO.	DIA.	FREE LENGHT	REQ'D STRETCH	COLD MIC. MEAS.	COLD PULL MIC. READING	FLATS TO TURN NUT	HOT STRETCH	TOTAL STRTCH	FLATS TO CORRECT	FINAL MEAS.	FINCH STRETCH
1	2	11.50	0.012	0.711	0.724			0.013			
2	2	11.50	0.012	0.695	0.708			0.013			
3	2	11.50	0.012	0.704	0.716			0.012			
4	2	11.50	0.012	0.671	0.683			0.012			
5	2	11.50	0.012	0.668	0.68			0.012			
6	2	11.50	0.012	0.688	0.7			0.012			
7	2	11.50	0.012	0.7	0.712			0.012			
8	2	11.50	0.012	0.678	0.689			0.011			
9	2	11.50	0.012	0.671	0.683			0.012			
10	2	11.50	0.012	0.719	0.731			0.012			
11	2	11.50	0.012	0.673	0.686			0.013			
12	2	11.50	0.012	0.686	0.698			0.012			
13	2	11.50	0.012	0.696	0.708			0.012			
14	2	11.50	0.012	0.624	0.636			0.012			
15	2	11.50	0.012	0.671	0.684			0.013			
16	2	11.50	0.012	0.677	0.69			0.013			
17	2	11.50	0.012	0.686	0.698			0.012			
18	2	11.50	0.012	0.625	0.637			0.012			
19	2	11.50	0.012	0.686	0.698			0.012			
20	2	11.50	0.012	0.701	0.713			0.012			

Tool # Used ________________ Cal. Due Date __________

As Found __________ Reading Taken By: _Bordeakircher, Hoylman Date: _10/19/01_____

As Assembled ___X_______ Reviewed By (W) Eng.: ______ Date: ____

SIEMENS
Westinghouse

CUSTOMER: AEP
LOCATION/UNIT #: MITCHELL #1

COUPLING BOLT STRETCH CHART

BB/FRAME: JOB NO.:
COMPONENT/S.O.: "E" COUPLING DWG.:

"E" COUPLING - JACK SHAFT TO LP2 GOV END

BOLT NO.	DIA.	FREE LENGHT	REQ'D STRETCH	COLD MIC. MEAS.	COLD PULL MIC. READING	FLATS TO TURN NUT	HOT STRETCH	TOTAL STRTCH	FLATS TO CORRECT	FINAL MEAS.	FINCH STRETCH
1	2	12.43	0.013	0.174	0.187			0.013			
2	2	12.43	0.013	0.208	0.221			0.013			
3	2	12.43	0.013	0.182	0.195			0.013			
4	2	12.43	0.013	0.194	0.207			0.013			
5	2	12.43	0.013	0.195	0.208			0.013			
6	2	12.43	0.013	0.182	0.196			0.014			
7	2	12.43	0.013	0.188	0.201			0.013			
8	2	12.43	0.013	0.19	0.203			0.013			
9	2	12.43	0.013	0.198	0.211			0.013			
10	2	12.43	0.013	0.205	0.219			0.014			
11	2	12.43	0.013	0.181	0.294			0.113			
12	2	12.43	0.013	0.162	0.275			0.113			
13	2	12.43	0.013	0.193	0.206			0.013			
14	2	12.43	0.013	0.18	0.293			0.113			
15	2	12.43	0.013	0.178	0.191			0.013			
16	2	12.43	0.013	0.189	0.203			0.014			
17	2	12.43	0.013	0.187	0.2			0.013			
18	2	12.43	0.013	0.195	0.208			0.013			
19	2	12.43	0.013	0.179	0.192			0.013			
20	2	12.43	0.013	0.193	0.207			0.014			

Tool # Used ______________________________ Cal. Due Date __________

As Found __________ Reading Taken By: _Bordeakircher, Hoylman Date: _10/19/01_____

As Assembled ___X______ Reviewed By (W) Eng.: ______ Date: ____

PT Rev. 00

FILE: F4

SIEMENS
Westinghouse

CUSTOMER: AEP
LOCATION/UNIT #: MITCHELL #1

COUPLING BOLT STRETCH CHART

BB/FRAME: JOB NO.:
COMPONENT/S.O.: "G" COUPLING DWG.:

"G" COUPLING - LP2 GEN END JS to GENERATOR

BOLT NO.	DIA.	FREE LENGHT	REQ'D STRETCH	COLD MIC. MEAS.	COLD PULL MIC. READING	FLATS TO TURN NUT	HOT STRETCH	TOTAL STRTCH	FLATS TO CORRECT	FINAL MEAS.	FINCH STRETCH
1	2	16.75	0.018	0.63	0.648			0.018			
2	2	16.75	0.018	0.387	0.395			0.008			
3	2	16.75	0.018	0.317	0.336			0.019			
4	2	16.75	0.018	0.393	0.412			0.019			
5	2	16.75	0.018	0.361	0.382			0.021			
6	2	16.75	0.018	0.388	0.408			0.02			
7	2	16.75	0.018	0.3	0.317			0.017			
8	2	16.75	0.018	0.356	0.374			0.018			
9	2	16.75	0.018	0.324	0.343			0.019			
10	2	16.75	0.018	0.369	0.389			0.02			
11	2	16.75	0.018	0.386	0.404			0.018			
12	2	16.75	0.018	0.316	0.335			0.019			
13	2	16.75	0.018	0.384	0.402			0.018			
14	2	16.75	0.018	0.386	0.406			0.02			
15	2	16.75	0.018	0.347	0.365			0.018			
16	2	16.75	0.018	0.383	0.402			0.019			
17	2	16.75	0.018	0.401	0.419			0.018			
18	2	16.75	0.018	0.325	0.344			0.019			
19	2	16.75	0.018	0.336	0.356			0.02			
20	2	16.75	0.018	0.348	0.367			0.019			

Tool # Used ______________________________ Cal. Due Date __________

As Found __________ Reading Taken By: _Vickers, Dunfee, Burnheimer Date: 10/19/01________

As Assembled ___X_______ Reviewed By (W) Eng.: ______ Date: ____

SIEMENS
Westinghouse

CUSTOMER: AEP
LOCATION/UNIT #: MITCHELL #1

COUPLING BOLT STRETCH CHART

BB/FRAME: JOB NO.:
COMPONENT/S.O.: "G" COUPLING DWG.:

"G" COUPLING - LP2 GEN END JS to GENERATOR

BOLT NO.	DIA.	FREE LENGHT	REQ'D STRETCH	COLD MIC. MEAS.	COLD PULL MIC. READING	FLATS TO TURN NUT	HOT STRETCH	TOTAL STRTCH	FLATS TO CORRECT	FINAL MEAS.	FINCH STRETCH
21	2	16.75	0.018	0.369	0.388			0.019			
22	2	16.75	0.018	0.351	0.369			0.018			
23	2	16.75	0.018	0.379	0.396			0.017			
24	2	16.75	0.018	0.369	0.387			0.018			

Tool # Used ______________________________ Cal. Due Date __________

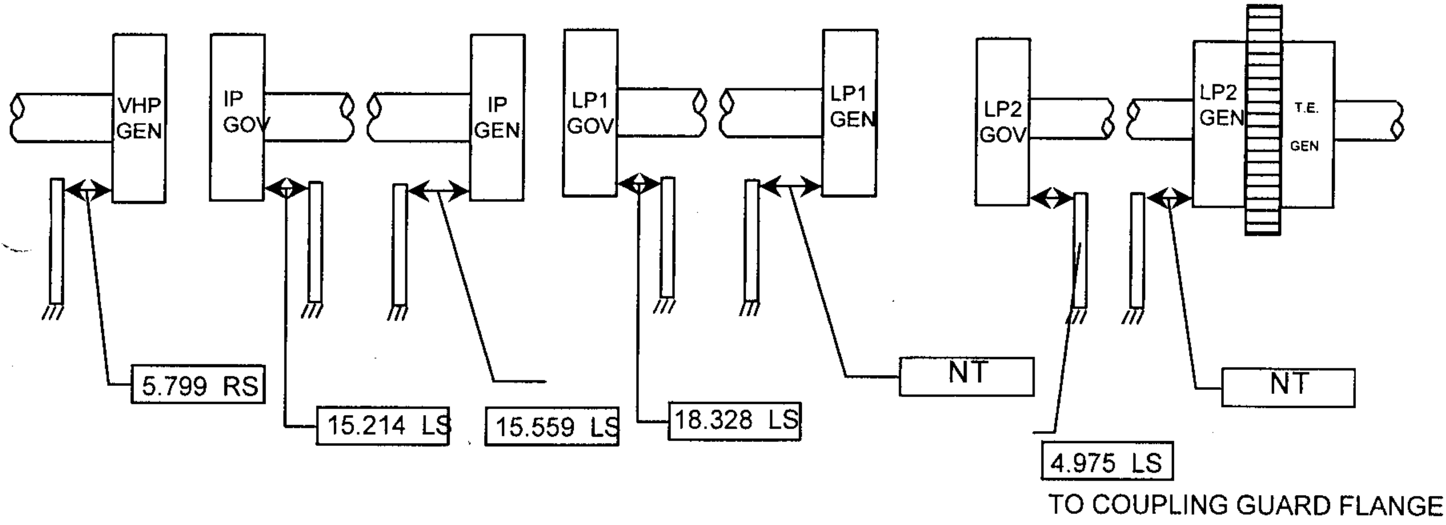
As Found __________ Reading Taken By: _Vickers, Dunfee, Burnheimer Date: 10/19/01________

As Assembled ___X_______ Reviewed By (W) Eng.: ______ Date: ____

SIEMENS
WESTINGHOUSE

CUSTOMER:	AEP	
LOCATION/UNIT #:	MITCHELL #1	
ROTOR "L" READINGS		
BB/FRAME:		JOB NO.:
COMPONENT/S.O.:		DWG.:

- "L" dimensions - outside reference



Note: IP, LP1 & LP2 readings were taken with coupling connected & thrust bearing assembled.
VHP readings were taken with VHP & IP coupling connected & rotor was push toward Gen. end and thrust bearing assembled.

Tool # Used ______________________________ Cal. Due Date __________

As Found ____X______ Reading Taken By: _Brothers, day & night shift__________ Date: __9/8 -9/10/01__

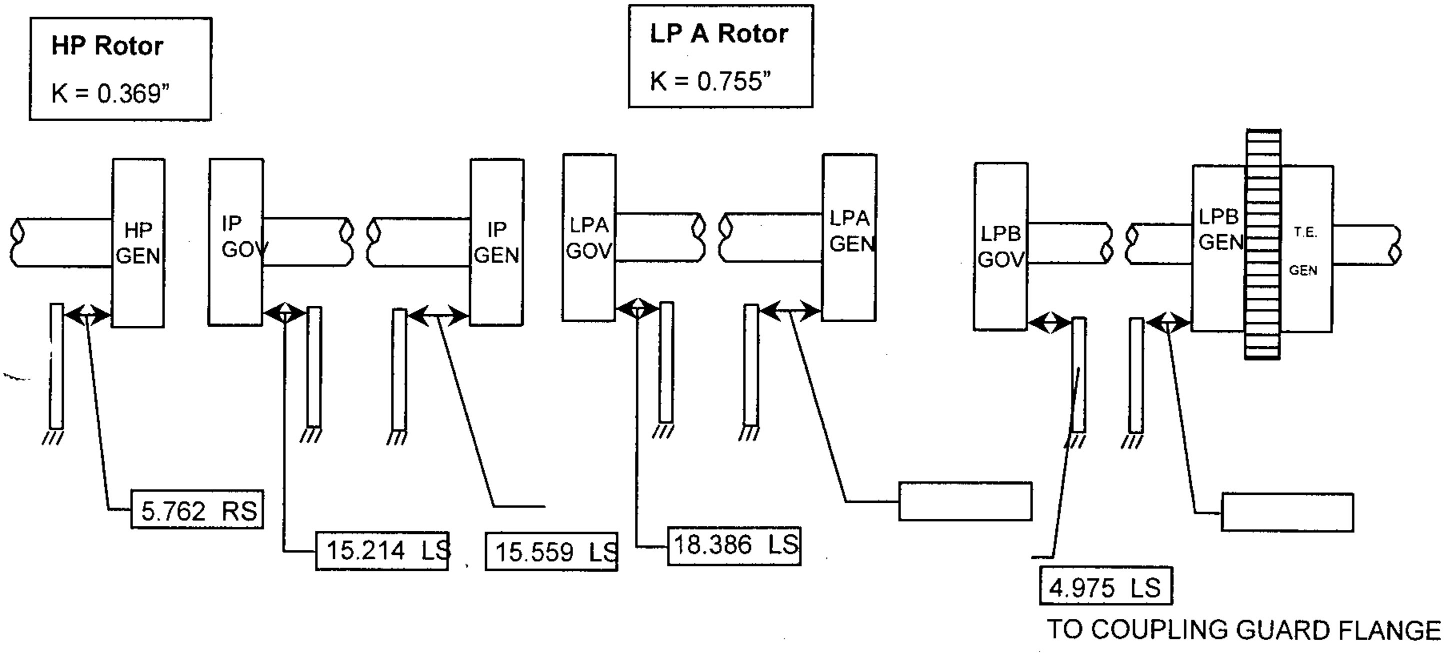
As Assembled __________ Reviewed By (W) Eng.: ______________________________ Date: __________

FILE: AL009.PPT Rev. 01

SIEMENS
WESTINGHOUSE

CUSTOMER:	AEP	
LOCATION/UNIT #:	MITCHELL #1	
ROTOR "L" READINGS		
BB/FRAME:		JOB NO.:
COMPONENT/S.O.:		DWG.:

- "L" dimensions - outside reference



Note: IP, LP1 & LP2 readings were taken with coupling connected & thrust bearing assembled.
VHP readings were taken with VHP & IP coupling connected & rotor was push toward Gen. end and thrust bearing assembled.

Tool # Used ______________________________ Cal. Due Date __________

As Found __________ Reading Taken By: _J.D. Foster / J. Brothers__________ Date: __10/28/01__

As Assembled ____X______ Reviewed By (W) Eng.: ____________________________ Date: __________

BFP Turbine

Rotor

Opening clearances and position checks were taken on the running boiler feed pump turbine rotor, S/N TD35141 and then the rotor was removed. This rotor was loaded onto a shipping skid and was sent to CMS for future repairs.

The spare rotor, S/N TD37853, was installed and compatibility clearances were taken on the rotor. All axial clearances between the new rotor and old blade rings were acceptable without adjustments to the diaphragms or packing.

As noted by engineering, the spare rotor has been retrofit with the continuous coupled last stage blades. It is the same modification that was done on the running rotor.

A new coupling hub was fit with proper interference and installed on the spare rotor.

The bearing journals were miced up pre-outage. All of the rotor gland shaft diameters were measured with a PI tape by STAR so that the new packing could be machined to provide proper clearance. All of the rotor shaft and blade diameters were measured by CMS personnel so that the seals could be machined with the proper clearance. All sizes are included with this report.

A retaining nut for the thrust runner on the very front of the rotor was removed. The flats of the nut were machined off so that the nut could be used as a journal for the new Bentley Nevada eccentricity probe. As discussed in the start-up section, this nut had to be remachined twice, and never ran true to the shaft. The final runout at this nut was 0.003".

After all of the diaphragms were installed and aligned, the rotor was reinstalled. Closing clearances were taken. The rotor had to be shifted off of the design "K" reading to a final K = 0.200". The rotor turned freely at this position and had acceptable float in both directions. The thrust bearing was built with the rotor at the new "K" position.

The thrust bearing was float checked and both thrust shims had to be ground to provide proper float and axial position.

Nozzle and Diaphragms

The upper half shell was unbolted and removed. The upper nozzle and upper diaphragms are locked into the upper half shell. After rotor clearances were taken and the rotor was removed, all of the diaphragms were sent to CMS. All of the bolting for the nozzle plate appeared to be in good condition.

The upper shell was then flipped over. The upper diaphragms were removed and sent to CMS. At CMS, the upper and lower diaphragms were all blast cleaned, NDE inspected, and had minor blade repairs done to them. The seal strips in the diaphragms were replaced with strips provided by STAR, and were machined to provide desired clearance. All diaphragms were returned to site.

The upper and lower shells were blast cleaned. The nozzle was NDE inspected and minor blading damage was repaired in place by a CMS welder.

The compatibility clearances showed that of the seal strips caulked in the shell, only stages 1, 2, and 3 on the pump side and stages 1 and 2 on the turbine side needed to be replaced. These seals were replaced by CMS mechanics and hand ground in place for clearance.

All of the gland packing rings were replaced with new packing, provided by STAR. STAR personnel cut the packing butts for all of the shaft packing.

After the diaphragms were returned to site, the diaphragms were installed and aligned to a tightwire. Jim Cable of AEP turbine engineering provided desired set points, and the diaphragms were aligned to within +/- 0.003" of these positions. See section on alignment. The diaphragms for the BFP turbine are supported by radial crush pins. The diaphragms were checked to make sure that they did not rock, and were corrected where necessary.

Drop checks were taken on the horizontal joints of the upper and lower diaphragms. The top radial crush pin clearance was adjusted as necessary.

After the rotor was installed, closing clearances were taken. Four rings of gland seal packing had to be machined due to having too tight of a clearance. STAR personnel did the machining.

The upper half diaphragms were installed in the upper casing. The locks were installed and the shell was flipped back over. When the shell was installed, the turbine rotor rolled freely.

BFP-T Shell

The upper and lower outer shells were blast cleaned on site by Federal Industrial Services and NDE inspected by CMS personnel. No cracks were noted in the shell.

All of the shell bolting was cleaned up and all bolt holes were tapped out. The horizontal joint of the shell halves was honed.

The expansion joints for the steam inlet piping was cleaned off using a wire wheel, and NDE inspected by CMS. No indications were noted.

After the shell was assembled, all shell bolting was torqued to Westinghouse standards.

The upper outer gland seals were unbolted and removed. The casings were cleaned up and reinstalled after the shell was installed.

SIEMENS
Westinghouse

CUSTOMER: AEP
LOCATION/UNIT #: MITCHELL #1

BFPT REACTION BLADING CLEARANCES

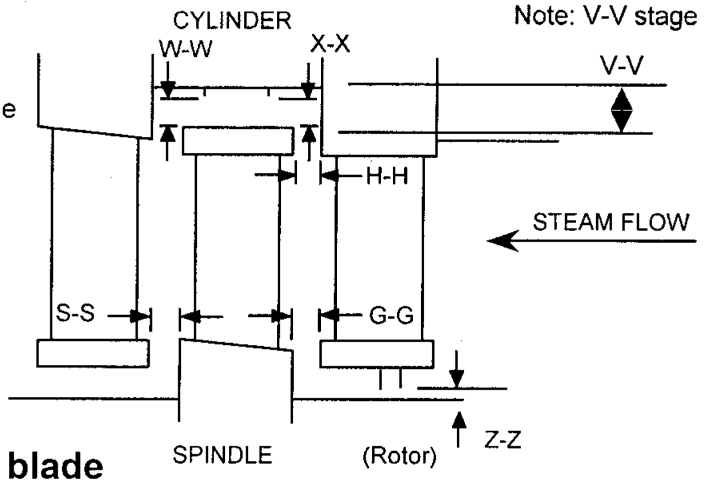
BB/FRAME: JOB NO.:
COMPONENT/S.O.: DWG.: 4482D79

Spare BFPT rotor TD 37853

Readings adjusted to
"K" = .200"
(G-G reading - 2nd stage
pump end on LS)
Calculated G-G, H-H,
S-S & "L" Readings

L pump LS = 1.152"
L Gov LS = .890"
L Gov RS = .891"

Note: V-V stage 6 blade tip clearance



Gov end - RH blade

	LEFT SIDE								RIGHT SIDE							
ROW	G-G	H-H	S-S		Z-Z	X-X	W-W	V-V	G-G	H-H	S-S		Z-Z	X-X	W-W	V-V
1	0.242	0.251	1.846		_	0.097	0.097	_	0.237	0.236	1.849		_	0.070	0.076	_
2	0.246	0.246	0.498		0.025	0.067	0.049	_	0.240	0.245	0.502		0.041	0.060	0.050	_
3	0.233	0.238	0.507		0.028	0.065	0.067	_	0.241	0.244	0.501		0.032	0.069	0.065	_
4	0.266	0.356	0.611		0.027	0.058	0.058	_	0.267	0.348	0.606		0.026	0.066	0.065	_
5	0.254	0.271	0.344		0.022	0.060	0.055	_	0.238	0.276	0.341		0.017	0.065	0.057	_
6	0.246	_	0.589		0.032	_	_	0.075	0.252	_	0.593		0.027	_	_	0.087

Design Z-Z = .015-.019
X-X, W-W = .033-.037 (first row), .040 (row2-3), .045 (row 4-5)

This data are readings calculated from the closing clearances to K = 0.200" final position.

Tool # Used ____________________ Cal. Due Date __________

As Found __________ Reading Taken By: _K. Riley______ Date: 10/6/01____

As Assembled Final ___X_____ Reviewed By (W) Eng.: ________________ Date: ______

FILE: F46586.PPT Rev. 00

SIEMENS
Westinghouse

CUSTOMER: AEP
LOCATION/UNIT #: MITCHELL #1

BFPT REACTION BLADING CLEARANCES

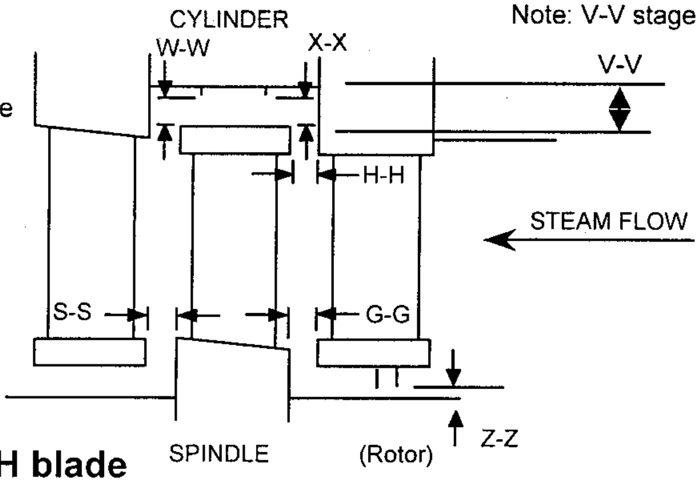
BB/FRAME: JOB NO.:
COMPONENT/S.O.: DWG.: 4482D79

Spare BFPT rotor TD 37853

Readings adjusted to
"K" = .200"
(G-G reading - 2nd stage
pump end on LS)
Calculated G-G, H-H,
S-S & "L" Readings

L pump LS = 1.152"
L Gov LS = .890"
L Gov RS = .891"

Note: V-V stage 6 blade tip clearance



Pump end - LH blade

	LEFT SIDE								RIGHT SIDE							
ROW	G-G	H-H	S-S		Z-Z	X-X	W-W	V-V	G-G	H-H	S-S		Z-Z	X-X	W-W	V-V
1	0.195	0.202	1.925		_	0.089	0.065	_	0.189	0.200	1.932		_	0.075	0.090	_
2	0.201	0.200	0.548		0.025	0.040	0.040	_	0.194	0.190	0.540		0.018	0.047	0.036	_
3	0.195	0.189	0.566		0.028	0.060	0.063	_	0.194	0.189	0.562		0.035	0.066	0.070	_
4	0.211	0.301	0.695		0.031	0.040	0.051	_	0.207	0.287	0.680		0.020	0.060	0.050	_
5	0.182	0.239	0.362		0.018	0.096	0.095	_	0.193	0.220	0.376		0.018	0.105	0.105	_
6	0.187	1.408	1.016		0.020	_	_	0.105	0.170	1.376	1.061		0.022	_	_	0.100

Design Z-Z = .015-.019
X-X, W-W = .033-.037 (first row), .040 (row2-3), .045 (row 4-5)

This data are readings calculated from the closing clearances to K = 0.200" final position.

Tool # Used ____________________ Cal. Due Date __________

As Found __________ Reading Taken By: _K. Riley______ Date: 10/6/01____

As Assembled Final ___X_____ Reviewed By (W) Eng.: ________________ Date: ______

SIEMENS
Westinghouse

CUSTOMER: AEP	
LOCATION/UNIT #: MITCHELL #1	
BFPT REACTION BLADING CLEARANCES	
BB/FRAME:	JOB NO.:
COMPONENT/S.O.:	DWG.: 4482D79

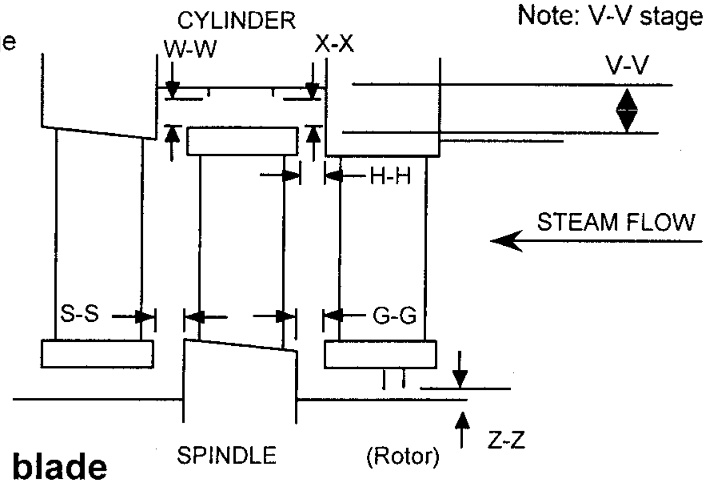
Spare BFPT rotor TD 37853

The rotor was set on
"K" = .177"
(G-G reading - 2nd stage pump end on LS)
Design K =.188"

L pump LS = 1.176"

L Gov LS = .866"
L Gov RS = .867"

Note: V-V stage 6 blade tip clearance



Gov end - RH blade

	LEFT SIDE								RIGHT SIDE							
ROW	G-G	H-H	S-S		Z-Z	X-X	W-W	V-V	G-G	H-H	S-S		Z-Z	X-X	W-W	V-V
1	0.266	0.275	1.822		_	0.097	0.097	_	0.261	0.260	1.825		_	0.070	0.076	_
2	0.270	0.270	0.474		0.025	0.067	0.049	_	0.264	0.269	0.478		0.041	0.060	0.050	_
3	0.257	0.262	0.483		0.028	0.065	0.067	_	0.265	0.268	0.477		0.032	0.069	0.065	_
4	0.290	0.380	0.587		0.027	0.058	0.058	_	0.291	0.372	0.582		0.026	0.066	0.065	_
5	0.278	0.295	0.320		0.022	0.060	0.055	_	0.262	0.300	0.317		0.017	0.065	0.057	_
6	0.270	_	0.565		0.032	_	_	0.075	0.276	_	0.569		0.027	_	_	0.087

Design Z-Z = .015-.019
X-X, W-W = .033-.037 (first row), .040 (row2-3), .045 (row 4-5)

This data is actual readings as taken with K = 0.177". Rotor was moved to K = 0.200" for final assembly

Tool # Used ____________________ Cal. Due Date __________

As Found __________ Reading Taken By: _K. Riley______ Date: 10/6/01____

As Assembled ___X_____ Reviewed By (W) Eng.: ________________ Date: ______

FILE: F46586.PPT Rev. 00

SIEMENS
Westinghouse

CUSTOMER: AEP
LOCATION/UNIT #: MITCHELL #1

BFPT REACTION BLADING CLEARANCES

BB/FRAME: JOB NO.:
COMPONENT/S.O.: DWG.: 4482D79

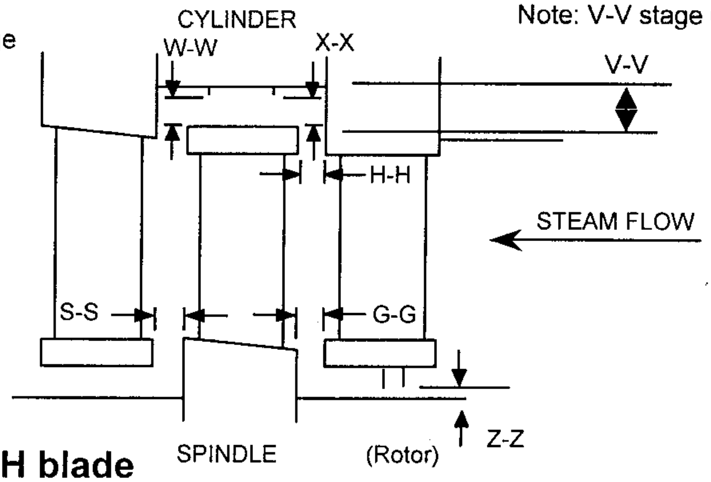
Spare BFPT rotor TD 37853

The rotor was set on
"K" = .177"
(G-G reading - 2nd stage
pump end on LS)
Design K =.188"

L pump LS = 1.176"

L Gov LS = .866"
L Gov RS = .867"

Note: V-V stage 6 blade tip clearance



Pump end - LH blade

	LEFT SIDE								RIGHT SIDE							
ROW	G-G	H-H	S-S		Z-Z	X-X	W-W	V-V	G-G	H-H	S-S		Z-Z	X-X	W-W	V-V
1	0.171	0.178	1.949		_	0.089	0.065	_	0.165	0.176	1.956		_	0.075	0.090	_
2	0.177	0.177	0.572		0.025	0.040	0.040	_	0.170	0.166	0.564		0.018	0.047	0.036	_
3	0.171	0.165	0.590		0.028	0.060	0.063	_	0.170	0.165	0.586		0.035	0.066	0.070	_
4	0.187	0.277	0.719		0.031	0.040	0.051	_	0.183	0.263	0.704		0.020	0.060	0.050	_
5	0.158	0.215	0.386		0.018	0.096	0.095	_	0.169	0.196	0.400		0.018	0.105	0.105	_
6	0.163	1.384	1.040		0.020	_	_	0.105	0.146	1.352	1.085		0.022	_	_	0.100

Design Z-Z = .015-.019
X-X, W-W = .033-.037 (first row), .040 (row2-3), .045 (row 4-5)

This data is actual readings as taken with K = 0.177". Rotor was moved to K = 0.200" for final assembly

Tool # Used ____________ Cal. Due Date ____________

As Found ____________ Reading Taken By: _K. Riley______ Date: 10/6/01____

As Assembled ___X_____ Reviewed By (W) Eng.: ____________ Date: ______

SIEMENS
Westinghouse

CUSTOMER: AEP	
LOCATION/UNIT #: MITCHELL #1	
BFPT ROTOR FLOAT	
BB/FRAME:	JOB NO.:
COMPONENT/S.O.:	DWG.:

Set rotor at K=.200
Calculated float & L

Spare BFPT Rotor TD 37853

"L" GOV LS =	0.890
"L" pump LS =	1.152
"K" =	0.200

ASSEMBLY RECORD					
CONDITION	TO GOV.	TO PUMP.	TRAVEL FWD	TRAVEL AFT	TOTAL TRAVEL
"L" GOV LS	0.782	1.029	0.108	0.139	0.247
"L" pump LS	1.257	1.007	0.105	0.145	0.250
Contact Point	#1 Outer galnd Row 2 spring back seal	#2 Outer galnd Row 4, 5 spring back seal			

Tool # Used ______________________ Cal. Due Date __________

As Found __________ Reading Taken By: _K. Riley__ Date: 10/6/01_____

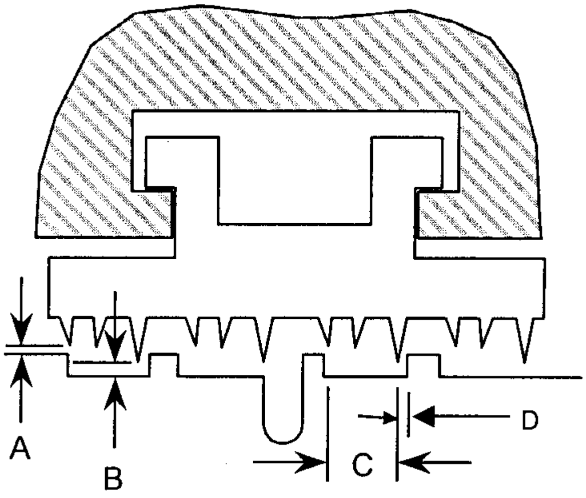
As Assembled Final ___X______ Reviewed By (W) Eng.: ______________ Date: _________

SIEMENS
WESTINGHOUSE

CUSTOMER: AEP
LOCATION/UNIT #: MITCHELL 1

BFPT GLAND SEAL CLR

BB/FRAME: JOB NO.:
COMPONENT/S.O.: DWG.:



Spare BFPT rotor TD 37853

Set "K" = .200"
Calculated axial C & D

		LEFT SIDE				RIGHT SIDE	
	ROW	A	B	C	D	A	B
GOV END OUTER GLAND	1	0.012	0.012	0.202	0.117	0.015	0.016
	2	0.012	0.012	0.204	0.113	0.015	0.015
	3	0.010	0.005	0.197	0.126	0.013	0.014
PUMP END OUTER GLAND	4	0.012	0.013	0.160	0.169	0.012	0.012
	5	0.014	0.014	0.140	0.189	0.013	0.013
	6	0.015	0.017	0.146	0.187	0.014	0.014

C, D DIMENSIONS TO BE MEASURED
C - Gov. end.
D - Pump end

Design : A, B = .010-.016

** **Data after machining by STAR.**

Tool # Used ______________ Cal. Due Date ______

As Found ________ Reading Taken By: __K. Riley__________ Date: _10/6/01____

As Assembled Final _____X_____ Reviewed By (W) Eng.: ______________ Date: ______

FILE: HP001.PPT & .CH1 Rev. 02

SIEMENS
WESTINGHOUSE

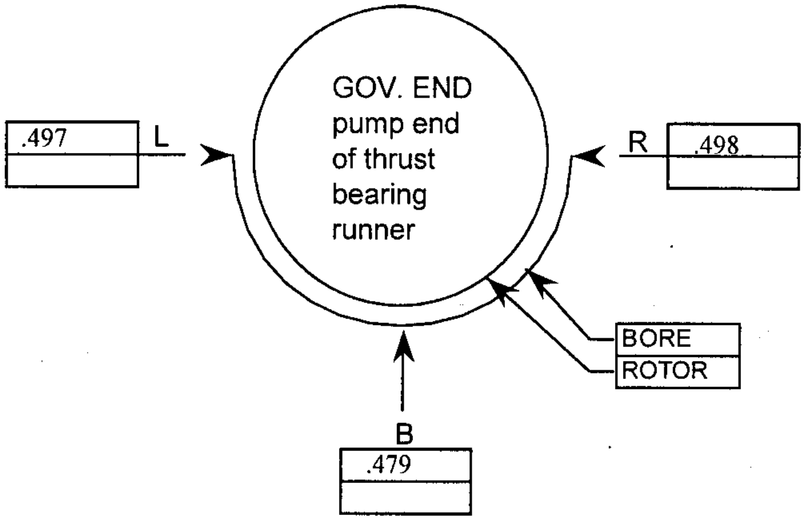
CUSTOMER:	AEP
LOCATION/UNIT #:	Mitchell #1

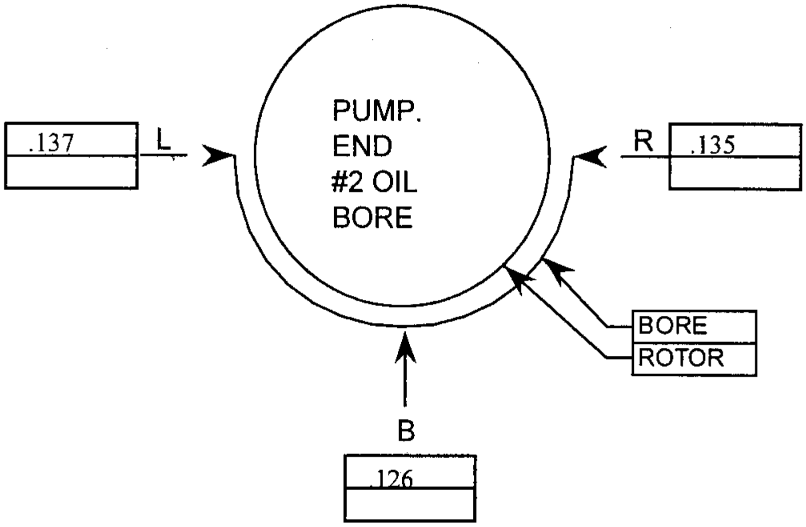
BFPT OIL BORE READING

BB/FRAME: JOB NO.:

COMPONENT/S.O.: BFPT ROTOR

Spare BFPT rotor TD 37853





E: HP023.PPT Rev. 01

Tool # Used ____________________ Cal. Due Date __________

As Found __________ Reading Taken By: ____Brothers________ Date: _10/5/01_________

As Assembled ____X______ Reviewed By (W) Eng.: ____________________ Date: __________

SIEMENS
Westinghouse

CUSTOMER: AEP
LOCATION/UNIT #: MITCHELL #1

BFPT REACTION BLADING CLEARANCES

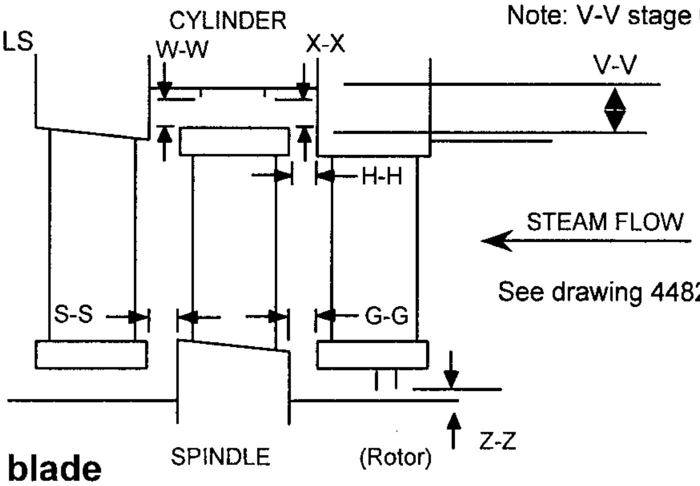
BB/FRAME: JOB NO.:
COMPONENT/S.O.: DWG.: 4482D79

Spare rotor rotor TD 37853 Compatibility Data

The rotor was set on
"K" = .195 2nd stage
pump end LS
Design K =.188

L pump =

Note: V-V stage 6 blade tip clearance



See drawing 4482D79 for sketch

Gov end - RH blade

	LEFT SIDE								RIGHT SIDE							
ROW	G-G	H-H	S-S		Z-Z	X-X	W-W	V-V	G-G	H-H	S-S		Z-Z	X-X	W-W	V-V
1	0.252	0.258	1.825		_	0.111	0.095	_	0.246	0.249	1.838		_	0.096	0.081	_
2	0.252	0.255	0.504		0.080	0.098	0.074	_	0.252	0.256	0.498		0.061	0.069	0.067	_
3	0.242	0.251	0.503		0.046	0.061	0.064	_	0.247	0.236	0.498		0.057	0.066	0.065	_
4	0.275	0.261	0.594		0.065	0.051	0.057	_	0.275	0.355	0.587		0.021	0.061	0.064	_
5	0.247	0.276	0.333		0.041	0.057	0.054	_	0.252	0.285	0.333		0.032	0.066	0.060	_
6	0.245	_	0.585		0.031	_	_	0.077	0.247	_	0.587		0.045	_	_	0.085

Design Z-Z = .015-.019
X-X, W-W = .033-.037

Tool # Used ______________________________ Cal. Due Date __________

As Found __________ Reading Taken By: _Bordenkircher / Doty_______ Date: 9/15/01____

As Charted ___X_____ Reviewed By (W) Eng.: ________________ Date: ______

SIEMENS
Westinghouse

CUSTOMER: AEP
LOCATION/UNIT #: MITCHELL #1

BFPT REACTION BLADING CLEARANCES

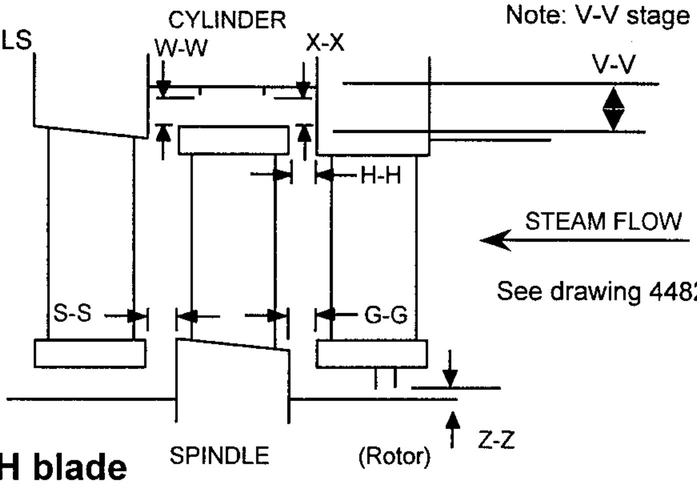
BB/FRAME: JOB NO.:
COMPONENT/S.O.: DWG.: 4482D79

Spare rotor rotor TD 37853 Compatibility Data

The rotor was set on
"K" = .195 2nd stage
pump end LS
Design K =.188

L pump =

Note: V-V stage 6 blade tip clearance



See drawing 4482D79 for sketch

Pump end - LH blade

	LEFT SIDE								RIGHT SIDE							
ROW	G-G	H-H	S-S		Z-Z	X-X	W-W	V-V	G-G	H-H	S-S		Z-Z	X-X	W-W	V-V
1	0.187	0.197	1.932		_	0.116	0.096	_	0.165	0.182	1.946		_	0.107	0.087	_
2	0.194	0.195	0.562		0.101	0.080	0.065	_	0.182	0.187	0.557		0.046	0.077	0.065	_
3	0.192	0.192	0.574		0.032	0.072	0.072	_	0.184	0.181	0.572		0.072	0.072	0.073	_
4	0.184	0.287	0.695		0.080	0.056	0.060	_	0.190	0.277	0.678		0.032	0.075	0.070	_
5	0.176	0.226	0.398		0.043	0.066	0.060	_	0.172	0.211	0.397		0.034	0.086	0.068	_
6	0.170	_	1.018		0.032	_	_	0.100	0.164	_	1.047		0.041	_	_	0.101

Design Z-Z = .015-.019
X-X, W-W = .033-.037

Tool # Used ______________ Cal. Due Date ________

As Found ________ Reading Taken By: _Bordenkircher / Doty______ Date: 9/15/01____

As Charted ___X_____ Reviewed By (W) Eng.: ______________ Date: ______

SIEMENS

Westinghouse

CUSTOMER: AEP
LOCATION/UNIT #: MITCHELL #1

BFPT ROTOR FLOAT

BB/FRAME: JOB NO.:
COMPONENT/S.O.: DWG.:

Spare Rotor TD 37853 Compatibility Data

"L" GOV =	0.445
"L" pump =	0.767
"K" =	0.195

ASSEMBLY RECORD

CONDITION	TO GOV.	TO PUMP.	TRAVEL FWD	TRAVEL AFT	TOTAL TRAVEL
"L" GOV	0.34	0.605	0.105	0.16	0.265
"L" pump	0.847	0.585	0.08	0.182	0.262
Contact Point	all long tooth casing packing to rotor	all long tooth casing packing to rotor			

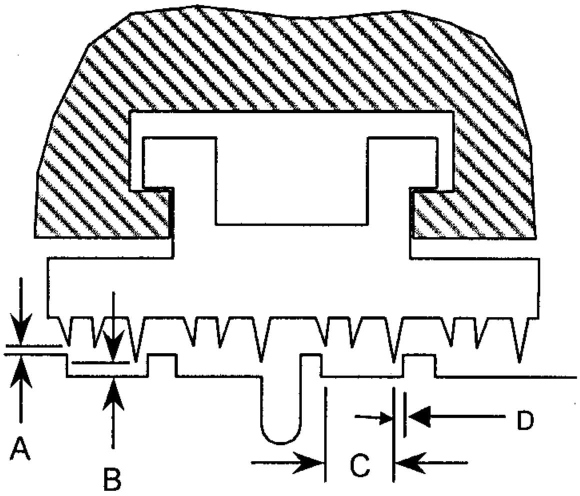
Tool # Used ____________________ Cal. Due Date __________

As Found __________ Reading Taken By: _J. Foster__ Date: 9/16/01_____

As Assembled ___X______ Reviewed By (W) Eng.: ______________ Date: _________

SIEMENS
WESTINGHOUSE

CUSTOMER: AEP	
LOCATION/UNIT #: MITCHELL 1	
BFPT GLAND SEAL CLR	
BB/FRAME:	JOB NO.:
COMPONENT/S.O.:	DWG.:



Spare rotor rotor TD 37853 Compatibility Data

		LEFT SIDE				RIGHT SIDE	
	ROW	A	B	C	D	A	B
GOV END OUTER GLAND	1	0.02	0.02	0.198	0.12	0.023	0.026
	2	0.024	0.022	0.166	0.119	0.026	0.033
	3	0.021	0.02	0.201	0.122	0.027	0.042
PUMP END OUTER GLAND	4	0.026	0.025	0.157	0.179	0.031	0.033
	5	0.025	0.028	0.157	0.167	0.039	0.041
	6	0.024	0.027	0.159	0.175	0.042	0.05

C, D DIMENSIONS TO BE MEASURED
C - Gov. end.
D - Pump end

Design : A, B = .010-.016

FILE: HP001.PPT & .CH1 Rev. 02

Tool # Used ______________________ Cal. Due Date __________

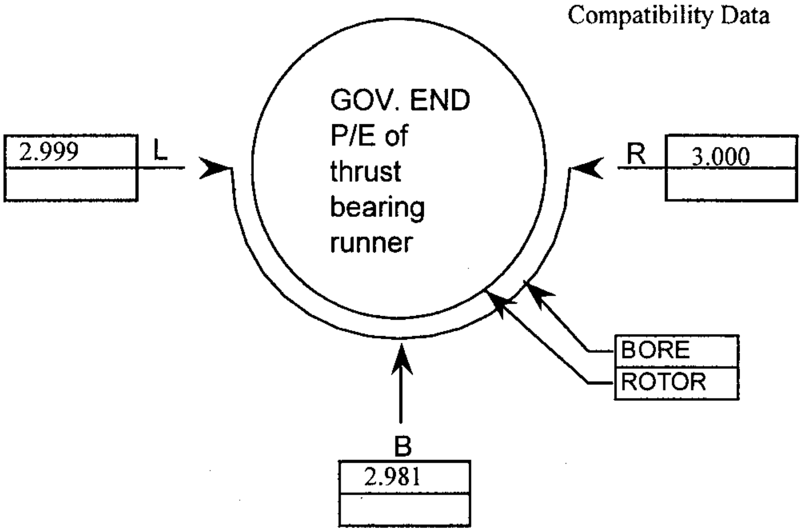
As Found ________ Reading Taken By: __J. Foster___________ Date: _9/16/01____

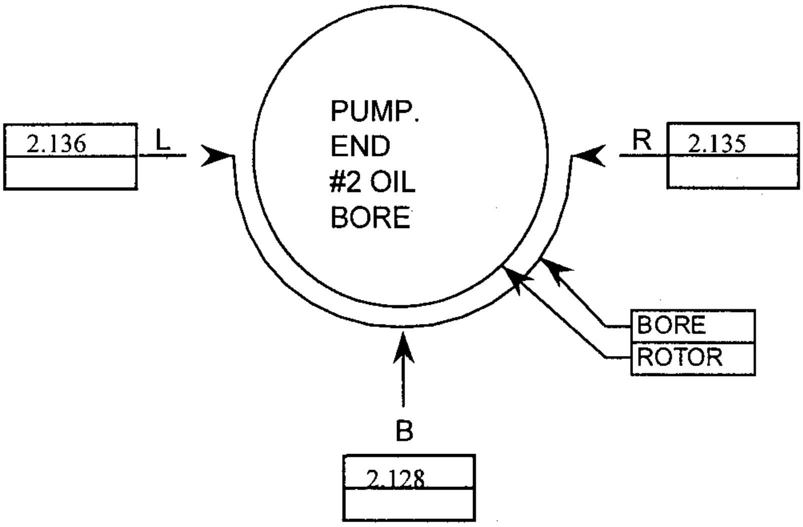
As Charted _____X_____ Reviewed By (W) Eng.: __________________________ Date: __________

SIEMENS
WESTINGHOUSE

CUSTOMER: AEP	
LOCATION/UNIT #: Mitchell #1	
BFPT OIL BORE READING	
BB/FRAME:	JOB NO.:
COMPONENT/S.O.: BFPT ROTOR	

Spare rotor TD 37853
Compatibility Data





Tool # Used ______________ Cal. Due Date ______

As Found ______ Reading Taken By: ____Bordenkircher / Doty________ Date: _9/15/01________

As Charted ____X______ Reviewed By (W) Eng.: ______________ Date: ______

SIEMENS
Westinghouse

CUSTOMER: AEP
LOCATION/UNIT #: MITCHELL #1

BFPT REACTION BLADING CLEARANCES

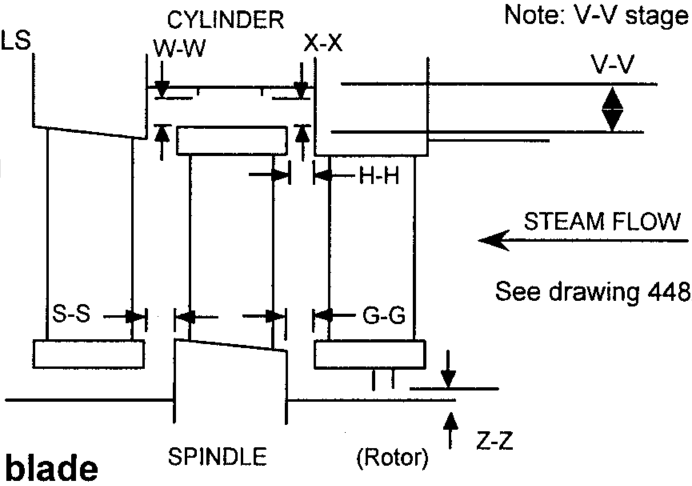
BB/FRAME: JOB NO.:
COMPONENT/S.O.: DWG.: 4482D79

As found rotor TD 35141

The rotor was set on
"K" = .210 2nd stage
pump end LS

L pump = 1.137

Readings were recorded with rotor toward pump end with thrust bearing assembled



Note: V-V stage 6 blade tip clearance

See drawing 4482D79 for sketch

Gov end - RH blade

	LEFT SIDE								RIGHT SIDE							
ROW	G-G	H-H	S-S		Z-Z	X-X	W-W	V-V	G-G	H-H	S-S		Z-Z	X-X	W-W	V-V
1	0.234	0.241	1.845		_	0.108	0.089	_	0.227	0.229	1.854		_	0.092	0.078	_
2	0.243	0.206	0.515		0.072	0.088	0.069	_	0.243	0.285	0.516		0.058	0.065	0.072	_
3	0.233	0.238	0.519		0.041	0.058	0.061	_	0.234	0.249	0.512		0.057	0.068	0.065	_
4	0.243	0.337	0.624		0.042	0.048	0.051	_	0.245	0.337	0.618		0.021	0.060	0.061	_
5	0.226	0.287	0.345		0.039	0.056	0.055	_	0.243	0.273	0.357		0.029	0.064	0.066	_
6	0.209	_	0.598		0.028	_	_	0.080	0.212	_	0.610		0.040	_	_	0.080

Tool # Used ______________________ Cal. Due Date __________

As Found __X________ Reading Taken By: _Fankhauser / Riba_______ Date: 9/14/01____

As Assembled ________ Reviewed By (W) Eng.: ________________ Date: ______

SIEMENS
Westinghouse

CUSTOMER: AEP
LOCATION/UNIT #: MITCHELL #1

BFPT REACTION BLADING CLEARANCES

BB/FRAME: JOB NO.:
COMPONENT/S.O.: DWG.: 4482D79

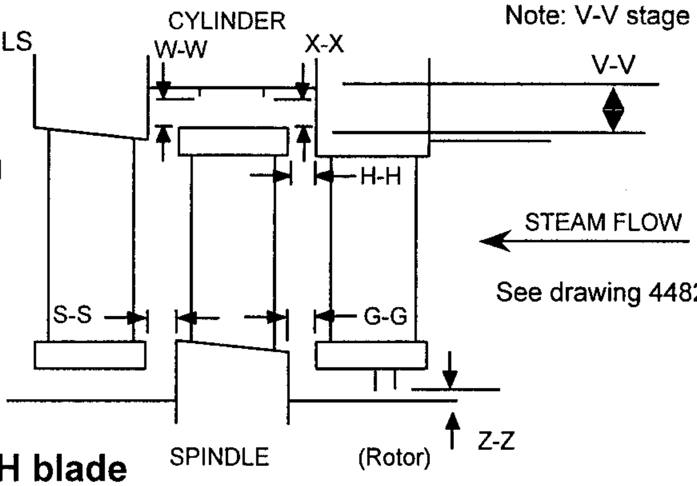
As found rotor TD 35141

The rotor was set on
"K" = .210 2nd stage
pump end LS

L pump = 1.137

Readings were recorded with rotor toward pump end with thrust bearing assembled

Note: V-V stage 6 blade tip clearance



See drawing 4482D79 for sketch

Pump end - LH blade

	LEFT SIDE								RIGHT SIDE							
ROW	G-G	H-H	S-S		Z-Z	X-X	W-W	V-V	G-G	H-H	S-S		Z-Z	X-X	W-W	V-V
1	0.206	0.209	1.901		_	0.111	0.094	_	0.201	0.201	1.911		_			_
2	0.210	0.207	0.538		0.098	0.075	0.062	_	0.193	0.199	0.543		0.045			_
3	0.198	0.204	0.558		0.031	0.066	0.067	_	0.202	0.193	0.553		0.069			_
4	0.194	0.304	0.681		0.078	0.060	0.061	_	0.200	0.292	0.643		0.031			_
5	0.188	0.248	0.345		0.036	0.065	0.056	_	0.188	0.230	0.371		0.033			_
6	0.190	_	1.003		0.023	_	_	0.084	0.174	_	1.016		0.031	_	_	0.087

Tool # Used ____________________ Cal. Due Date __________

As Found __X________ Reading Taken By: _Fankhauser / Riba_______ Date: 9/14/01____

As Assembled ________ Reviewed By (W) Eng.: ________________ Date: ______

SIEMENS

Westinghouse

CUSTOMER: AEP

LOCATION/UNIT #: MITCHELL #1

BFPT ROTOR FLOAT

BB/FRAME: JOB NO.:

COMPONENT/S.O.: DWG.:

As found rotor TD 35141

"L" GOV =	
"L" pump =	1.137
"K" =	.210 LS pump end

ASSEMBLY RECORD					
CONDITION	TO GOV.	TO PUMP.	TRAVEL FWD	TRAVEL AFT	TOTAL TRAVEL
"L" GOV					
"L" pump	1.29	0.982	0.153	0.155	0.308
Contact Point	all long tooth casing packing to rotor	all long tooth casing packing to rotor			

Tool # Used ______________________ Cal. Due Date __________

As Found ____X______ Reading Taken By: Fauk Hauser / Risa___ Date: 9/15/01_____

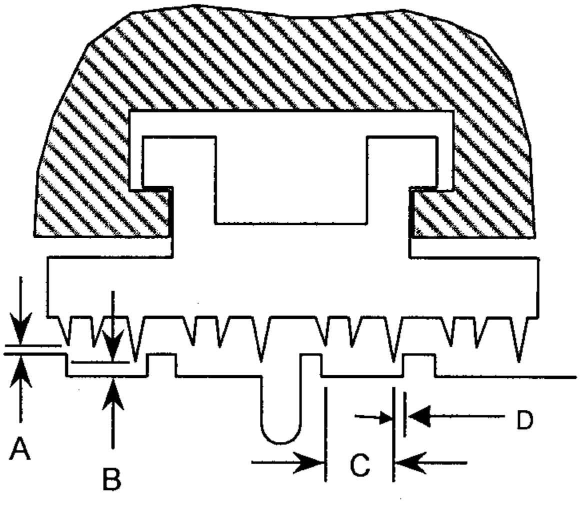
As Assembled _________ Reviewed By (W) Eng.: ______________ Date: _________

SIEMENS
WESTINGHOUSE

CUSTOMER: AEP
LOCATION/UNIT #: MITCHELL 1

BFPT GLAND SEAL CLR

BB/FRAME: JOB NO.:
COMPONENT/S.O.: DWG.:



As found rotor TD 35141

		LEFT SIDE				RIGHT SIDE	
	ROW	A	B	C	D	A	B
GOV END OUTER GLAND	1	0.019	0.021	0.165	0.152	0.025	0.029
	2	0.014	0.028	0.157	0.16	0.034	0.035
	3	0.021	0.021	0.16	0.144	0.026	0.045
PUMP END OUTER GLAND	4	0.026	0.027	0.139	0.181	0.03	0.032
	5	0.025	0.027	0.149	0.172	0.04	0.042
	6	0.022	0.027	0.145	0.175	0.033	0.048

C, D DIMENSIONS TO BE MEASURED
C - Gov. end.
D - Pump end

FILE: HP001.PPT &.CH1 Rev. 02

Tool # Used ____________________ Cal. Due Date __________

As Found ___X_____ Reading Taken By: __Bordenkircher / Doty____________ Date: _9/14/01____

As Assembled __________ Reviewed By (W) Eng.: ____________________ Date: __________

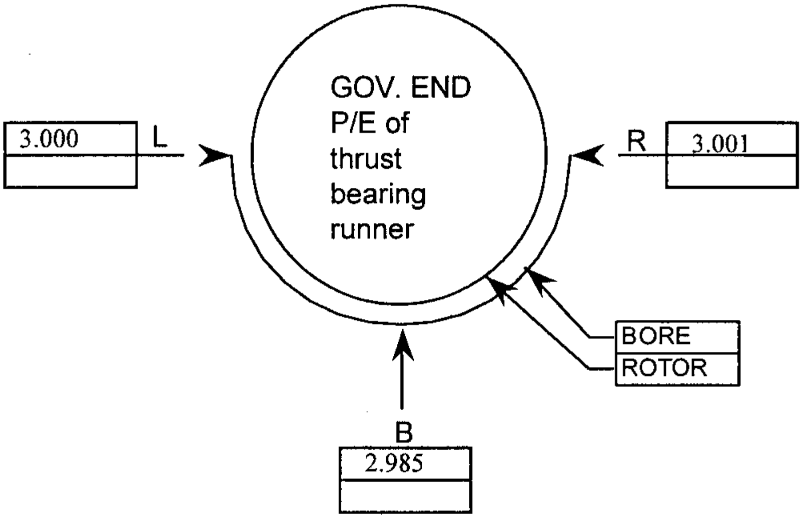
SIEMENS
WESTINGHOUSE

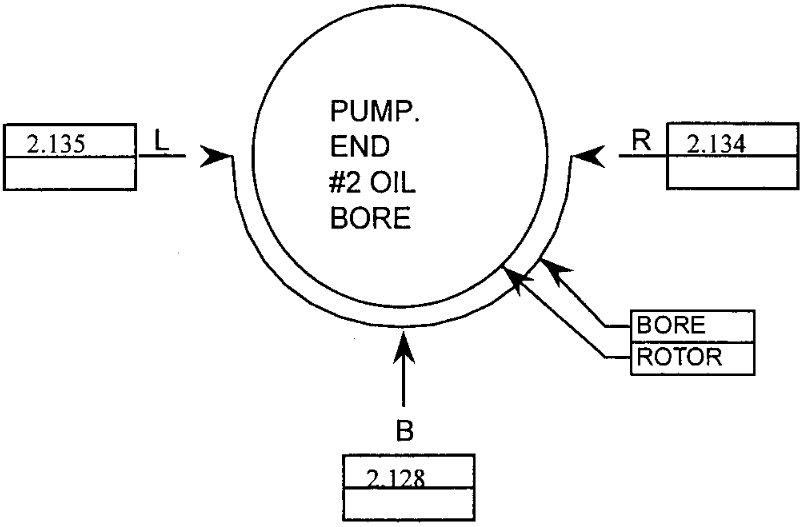
CUSTOMER: AEP
LOCATION/UNIT #: Mitchell #1

BFPT OIL BORE READING

BB/FRAME: JOB NO.:
COMPONENT/S.O.: BFPT ROTOR

As found rotor TD 35141





HP023.PPT Rev. 01

Tool # Used ______________________ Cal. Due Date __________

As Found ____X______ Reading Taken By: ____T. Riba / T. Fankhauser________ Date: _9/15/01_________

As Assembled __________ Reviewed By (W) Eng.: ______________________ Date: __________

BFP Turbine Bearings, Thrust Bearing, and Oil Deflectors

Bearings

The BFP turbine bearings (T-1 and T-2) were inspected as part of the BFP turbine rotor change-out. Both bearings are Westinghouse style tilt pad bearings, with 4 bearing pads.

After initial disassembly, the bearings were inspected visually. Both bearings appeared to be in good condition. CMS personnel performed a ultrasonic inspection for the babbitt bond on both bearings.

Both bearings were checked to the shaft for clearance using fuse wire. Both bearings were then fitted to the rotor with 0.008" shim stock wrapped around the journal. The bearings were scraped until 90% contact was achieved. Note that there is no mandrel available for inspecting these two bearings.

The bearings were installed and were squared to the shaft after the rotor was installed.

Thrust Bearing

The thrust bearing for the feed pump turbine is a Kingsbury style thrust bearing with tilting thrust pads and one seal oil ring on each side of the thrust bearing.

The thrust bearing was completely disassembled. All of the thrust bearing pads appeared to be in good condition. CMS personnel checked the babbitt bonding of the pads and all were acceptable. The thrust pads were checked to a flat plate (thrust runner) and were scraped until 90% contact was achieved.

The thrust bearing seal rings were inspected and compared to the shaft sizes of the spare HP rotor. Both seal rings had acceptable clearance and were used as found.

The thrust bearing was assembled and the total rotor float was checked. Both thrust shims had to be machined, and a final rotor float of 0.016" was accepted. The seal rings were then installed. The shims positioned the BFP turbine rotor at the desired "L" position.

Oil Deflectors

The oil deflectors for the BFP turbine rotor were disassembled and inspected as part of the turbine outage. All three oil deflectors were cleaned up, assembled, and miced up. All three oil deflectors were out of specs and were replaced with spare components.

These oil deflectors are all the aluminum roll in style, with no adjustment pins for setting the oil deflectors to the rotor.

There is significant shaft size difference for the oil deflector on the pump side of #2 bearing. There is a 1.500" difference in the size of the journals.

Rotor Journal Condition

BFP Turbine

Plant: ML

Unit 1

Turbine Serial No.

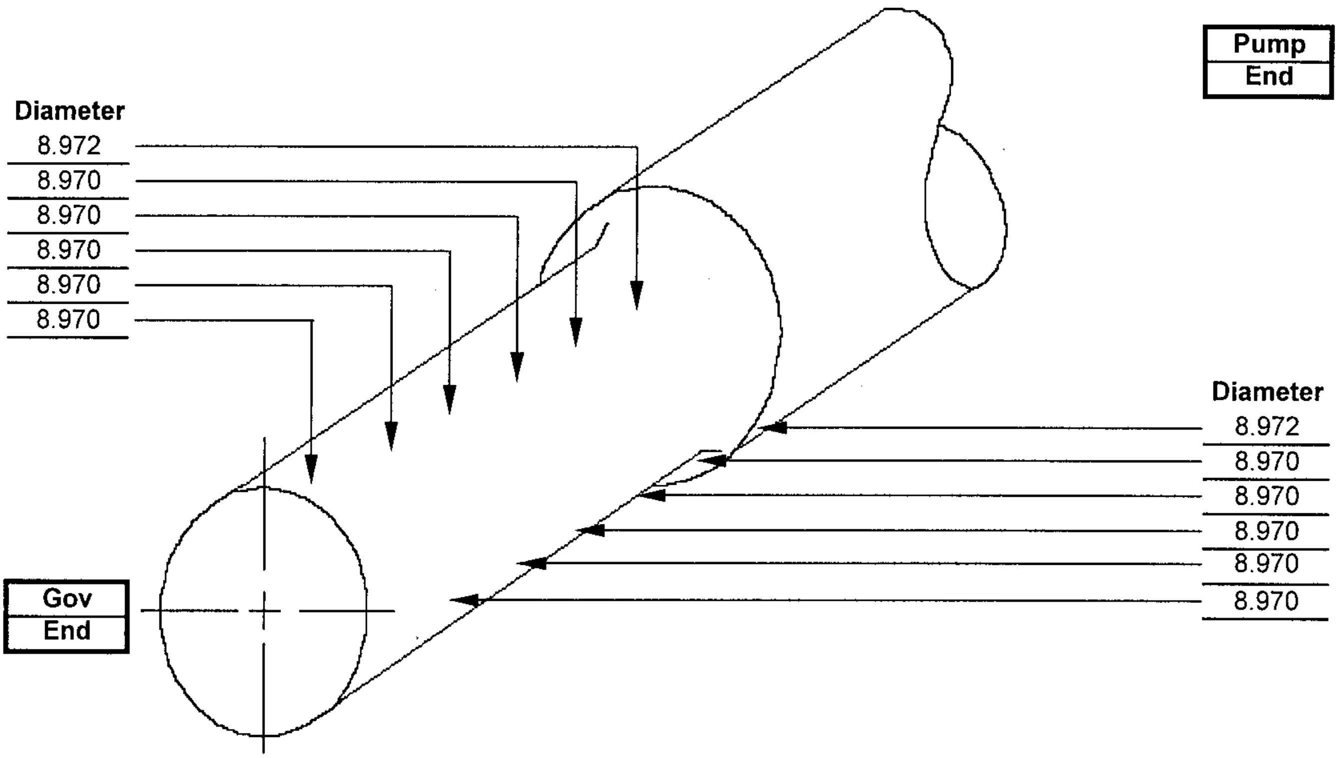
Date: 9/24/01

As Found/Final Final

Prepared by T. Fankhauser

Journal Number **T-1**

Note: Mark on sketch to show grooving, discoloration, carbon inclusions, or irregularities in the journal surface.



Out of Roundness

Diameters		Out of Round
0°	90°	
8.9720	8.9720	0.0
8.9700	8.9700	0.0
8.9700	8.9700	0.0
8.9700	8.9700	0.0
8.9700	8.9700	0.0
8.9700	8.9700	0.0

Journal Sizes

	0°	90°	All
Maximum	8.9720	8.9720	8.9720
Minimum	8.9700	8.9700	8.9700
Difference	0.0020	0.0020	0.0020
Average	8.9703	8.9703	8.9703

Comments:

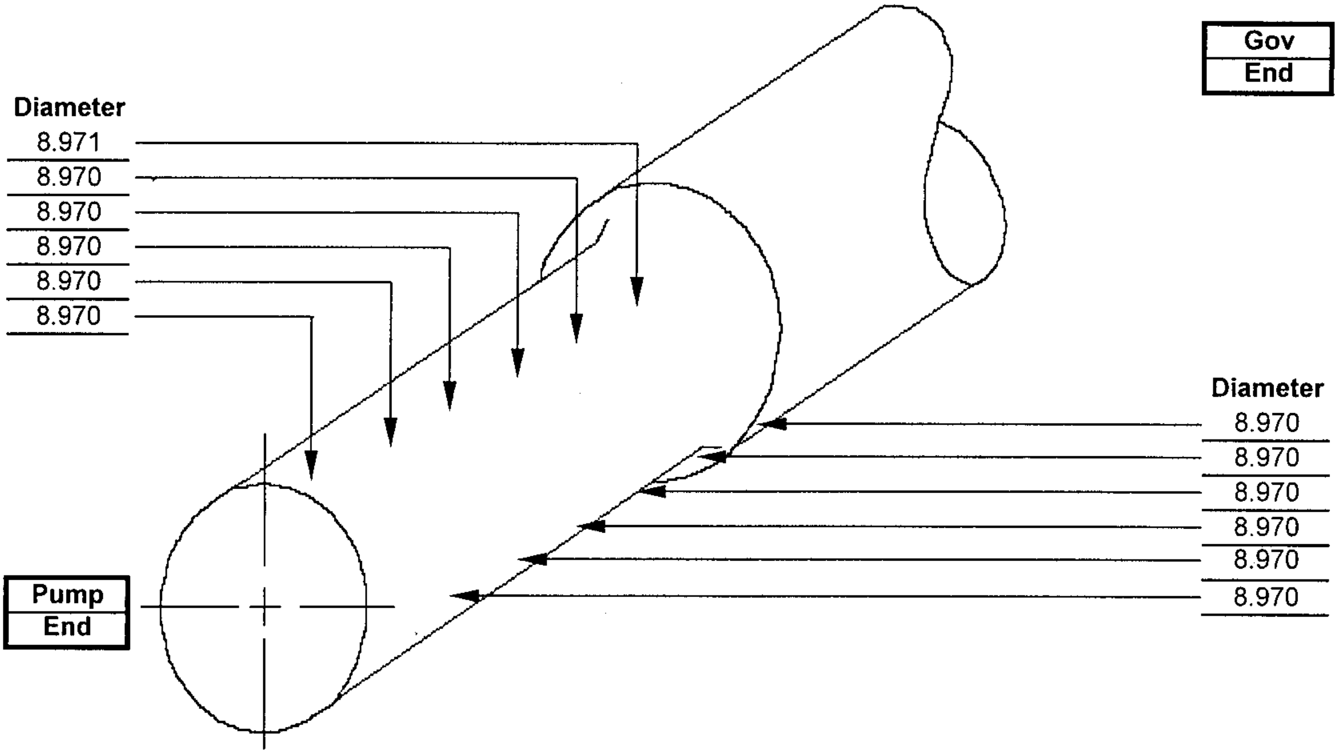
Rotor Journal Condition

BFP Turbine

Plant: ML
Unit 1
Turbine Serial No.
Date: 9/24/01
As Found/Final Final
Prepared by T. Fankhauser

Journal Number T-2

Note: Mark on sketch to show grooving, discoloration, carbon inclusions, or irregularities in the journal surface.



Out of Roundness

Diameters		Out of Round
0°	90°	
8.9710	8.9700	1.0
8.9700	8.9700	0.0
8.9700	8.9700	0.0
8.9700	8.9700	0.0
8.9700	8.9700	0.0
8.9700	8.9700	0.0

Journal Sizes

	0°	90°	All
Maximum	8.9710	8.9700	8.9710
Minimum	8.9700	8.9700	8.9700
Difference	0.0010	0.0000	0.0010
Average	8.9702	8.9700	8.9701

Comments:

Oil Deflector Clearances

BFP Turbine

Plant & Unit ML 1

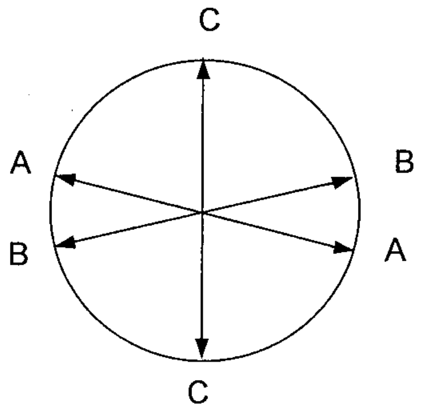
Prepared by D. Robinson

Date(m/d/y) 10/5/01

As Found / Final Data As Found

Turbine S/N:

INSPECTIONS & CHECKS				CODE	
Teeth Inspected				**X**	Work Carried Out
Journals Inspected				**N**	Not Done
				NA	Not Applicable
				C	See Comments
				V	Visual Inspection
				MP	Mag. Particle
				UT	Ultrasonic
				PT	Penetrant



Location Number	Oil Deflector			Journal Dia	Clearance			Condition Comment
	A-Dia	B-Dia	C-Dia		Average	Min.	Max.	
#1	9.526	9.523	9.532	9.481	0.046	0.042	0.051	Spare shaft dia.
#2	9.530	9.558	9.570	9.479	0.074	0.051	0.091	Spare shaft dia.
#3	6.055	6.040	6.067	7.479	-1.425	-1.439	-1.412	Spare shaft dia.

Comments:

Oil Deflector Clearances

BFP Turbine

Plant & Unit ML 1

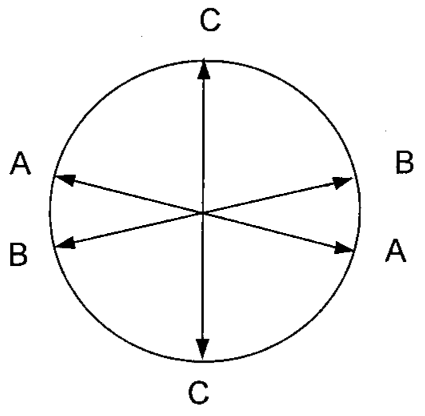
Prepared by D. Robinson

Date(m/d/y) 10/5/01

As Found / Final Data Final

Turbine S/N:

INSPECTIONS & CHECKS			CODE	
Teeth Inspected			**X**	Work Carried Out
Journals Inspected			**N**	Not Done
			NA	Not Applicable
			C	See Comments
			V	Visual Inspection
			MP	Mag. Particle
			UT	Ultrasonic
			PT	Penetrant

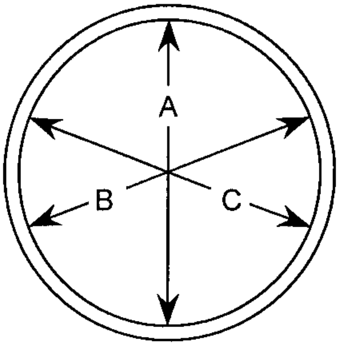


Location Number	Oil Deflector A-Dia	B-Dia	C-Dia	Journal Dia	Clearance Average	Min.	Max.	Condition Comment
#1	9.502	9.504	9.505	9.481	0.023	0.021	0.024	New oil deflector
#2	9.499	9.499	9.496	9.479	0.019	0.017	0.020	New oil deflector
#3	7.497	7.497	7.497	7.479	0.018	0.018	0.018	New oil deflector

Comments:

SIEMENS
WESTINGHOUSE

CUSTOMER: AEP	
LOCATION/UNIT #: MITCHELL 1	
BFPT THRUST CAGE OIL SEAL CLEARANCE	
BB/FRAME:	JOB NO.:
COMPONENT/S.O.:	DWG.:



	AXIAL CLR			DIAMETRIC CLEARANCE				
SEAL	Groove Width	Ring Thickness	axial clr.	A	B	C	SHAFT DIA.	AVE CLR
GOV END	0.501	0.498	0.003	4.757	4.769	4.769	4.755	0.010
PUMP END	0.501	0.498	0.003	5.007	5.005	5.006	4.998	0.008

Tool # Used ______________________________

Cal. Due Date __________

As Found __________

Reading Taken By: _T. Fankhauser__________

Date: _10/17/01____

As Assembled ____X______

Reviewed By (W) Eng.: __________________

Date: _________

BFP Turbine Valves

BFPT Stop Valves

The BFP turbine stop valves were completely disassembled. The valve componets were blast cleaned by Federal Industrial, and then NDE inspected by CMS personnel.

All stem and bushing sizes were checked and compared for clearance. The stems were checked for runout. The stem for the right side SV was badly scarred and was replaced with a new stem. The stem for the left side SV had heavy scale on it, and was polished. All of the valve bushings were honed as necessary to provide for proper clearance.

The BFPT SV studs were all checked using ultrasonic detectors. The SV seats were also NDE inspected.

The servomotors for the BFP SV's were removed and sent out for inspections and repairs.

The SV bypass lift was checked on both valves. The valve seats were lapped until 100% contact was achieved with the disks. The SV was reassembled and all bonnet bolting was torqued using the air torque wrench. The spring cans and servomotors were then reassembled.

The over travel was set on the servomotors and the spring can and linkage arms were installed. The BFPT SV's were stroked by ICT personnel. Problems were noted in stroking the left SV, namely the fact that the servo had to be used to close the valve rather than the spring pressure driving the valve shut. The springs and linkages were all inspected and reset. The servo was also thought to be part of the problem and was inspected and repaired.

BFPT Control Valves

The BFP turbine control valves are bar lift style valves with 2 valves for each of the lift bars. Both the left and right side control valves were disassembled. The valve plugs had to be removed from the lift bars in order to complete the inspection.

The lifting rods were removed and cleaned up. The stems and bushings were inspected for clearance. The runout of the lift rods was also checked. Three of the lift rods were bent and were replaced with new lift rods. Two of the bushings were oversized and were replaced with new bushings.

The BFP CV servomotors were removed and sent out to a vendor for rebuild.

All BFPT CV components were sand blasted where customary by Federal Industrial Services. All components were NDE inspected by CMS personnel. A crack was noted in the valve cover. This crack was ground and filler welded.

The right side – pump end valve seat was found loose in its fit. The seal welds had cracked and the seat had rotated ninety degrees. The old seat was removed. A new seat was obtained from ML plant stores. The seat and its fit were cleaned by hand and miced up. There was 3 mils press fit between the seat and its fit, and both were round within design specs. The new seat was frozen and installed. It was then welded in four places per Westinghouse specs using E308-15 rod.

All of the studs were checked using ultrasonic detectors and were OK for reuse. The other valve seats were NDE inspected with no indications found.

The valve lift was set per Westinghouse drawing and the nuts were tacked into place. The valve lift bars were installed and the crossheads were locked and pinned. The drawing showing these settings is attached. The BFP CV covers were installed and the bolting was torqued. The spring cans were installed and then the servomotors were installed and set with ½ inch over travel.

The valves all stroked properly under the direction of the plant ICT personnel.

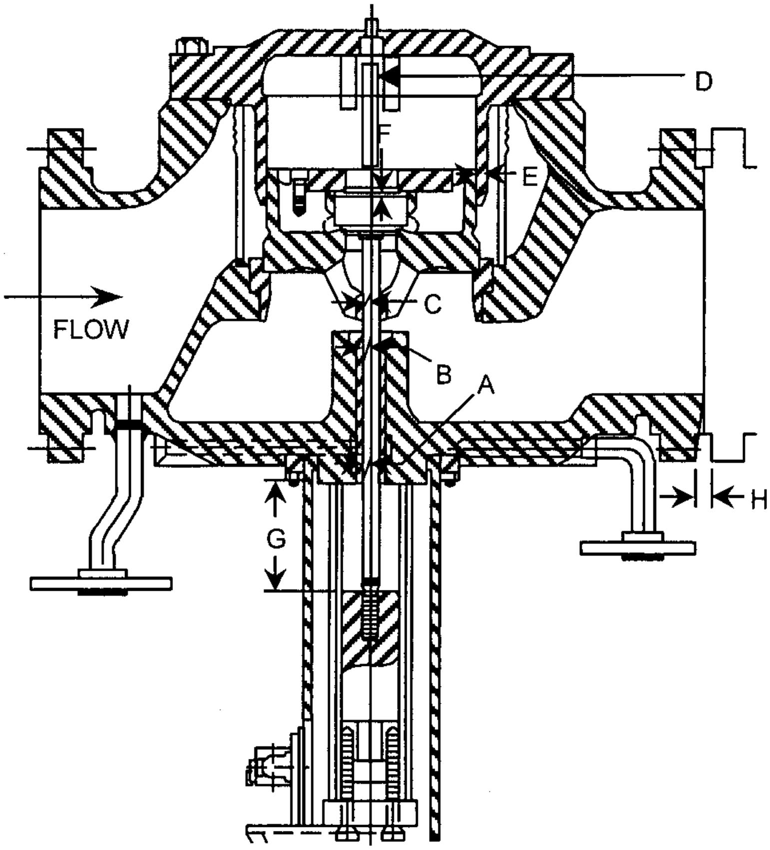
**SIEMENS
WESTINGHOUSE**

CUSTOMER: AEP
LOCATION/UNIT #: MITCHELL #1

BFPT STOP VALVE CLEARANCES

BB/FRAME: JOB NO:
COMPONENT/S.O.: DWG.:

Right Side



BFPT STOP VALVE CLEARANCES - RIGHT SIDE							
LOCATION	INSIDE DIAMETER	OUTSIDE DIAMETER	CLEARANCE	LOCATION	INSIDE DIAMETER	OUTSIDE DIAMETER	CLEARANCE
A	1.504	1.497	0.007	E	17.995 /18.005	17.955	.040 / .050
B	1.506	1.497	0.009	F	PILOT VALVE AT DISASSEMBLY = TRAVEL AT REASSEMBLY =		
C	1.512	1.500	0.012	G	MAIN VALVE AT DISASSEMBLY = TRAVEL AT REASSEMBLY =		
D	1.502/1.504	1.500	.002/.004	H			

Note: installed new stem

Tool # Used ____________________ Cal. Due Date __________

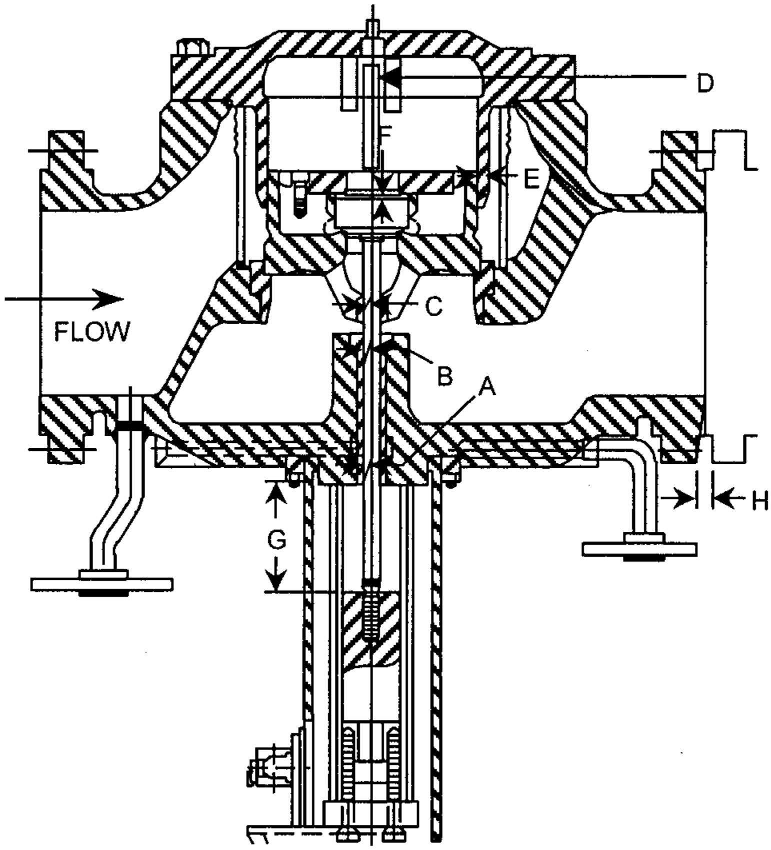
As Found _________ Reading Taken By: ___J. Brothers________________ Date: _9/24/01____

As Assembled _____X_____ Reviewed By (W) Eng.: ____________________ Date: __________

**SIEMENS
WESTINGHOUSE**

CUSTOMER: AEP	
LOCATION/UNIT #: MITCHELL #1	
BFPT STOP VALVE CLEARANCES	
BB/FRAME:	JOB NO:
COMPONENT/S.O.:	DWG.:

Left Side



BFPT STOP VALVE CLEARANCES - LEFT SIDE

LOCATION	INSIDE DIAMETER	OUTSIDE DIAMETER	CLEARANCE	LOCATION	INSIDE DIAMETER	OUTSIDE DIAMETER	CLEARANCE
A	1.505	1.497	0.008	E	18.000 /18.005	17.955	.045 / .050
B	1.502	1.496	0.006	F	PILOT VALVE AT DISASSEMBLY = TRAVEL AT REASSEMBLY =		
C	1.513	1.499	0.014	G	MAIN VALVE AT DISASSEMBLY = TRAVEL AT REASSEMBLY =		
D	1.507	1.498	0.009	H			

Tool # Used ______________________ Cal. Due Date __________

As Found ____X_____ Reading Taken By: ___Fankhauser_________________ Date: _9/21/01____

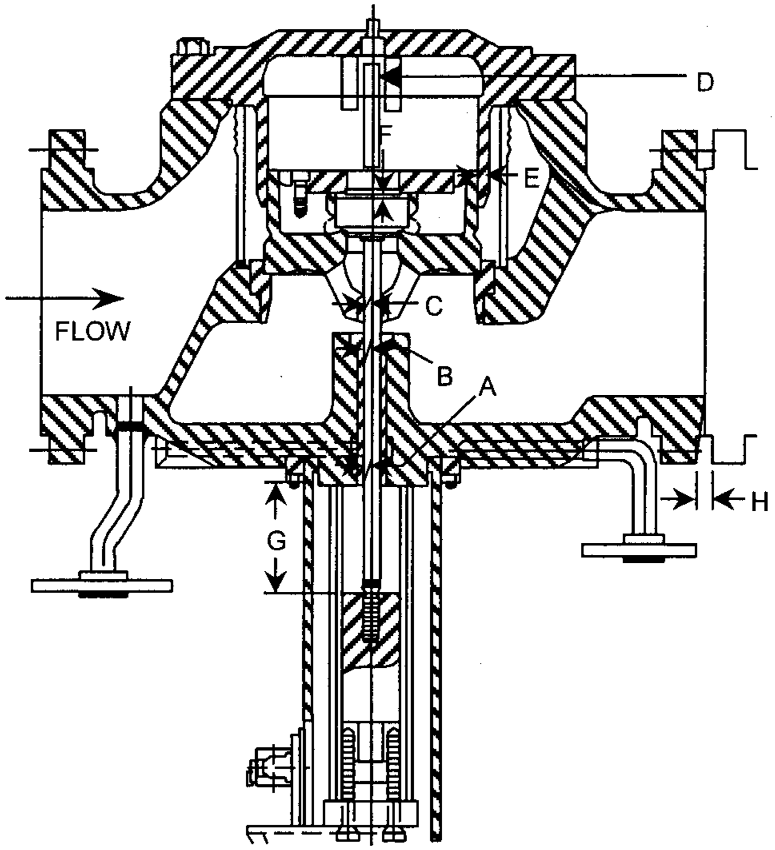
As Assembled __________ Reviewed By (W) Eng.: ____________________________ Date: __________

FILE: FPLPSV01.PPT Rev. 00

SIEMENS
WESTINGHOUSE

CUSTOMER: AEP	
LOCATION/UNIT #: MITCHELL #1	
BFPT STOP VALVE CLEARANCES	
BB/FRAME:	JOB NO:
COMPONENT/S.O.:	DWG.:

Right Side



BFPT STOP VALVE CLEARANCES - RIGHT SIDE							
LOCATION	INSIDE DIAMETER	OUTSIDE DIAMETER	CLEARANCE	LOCATION	INSIDE DIAMETER	OUTSIDE DIAMETER	CLEARANCE
A	1.504	1.497	0.007	E	17.995 /18.005	17.955	.040 / .050
B	1.506	1.497	0.009	F	PILOT VALVE AT DISASSEMBLY = TRAVEL AT REASSEMBLY =		
C	1.512	1.499	0.013	G	MAIN VALVE AT DISASSEMBLY = TRAVEL AT REASSEMBLY =		
D	1.502/1.504	1.495/1.496 **	.006/.009	H			

** Stem badly scarred

Tool # Used ____________________ Cal. Due Date __________

As Found ____X_____ Reading Taken By: ___Fankhauser________________ Date: _9/21/01____

As Assembled __________ Reviewed By (W) Eng.: ____________________ Date: __________

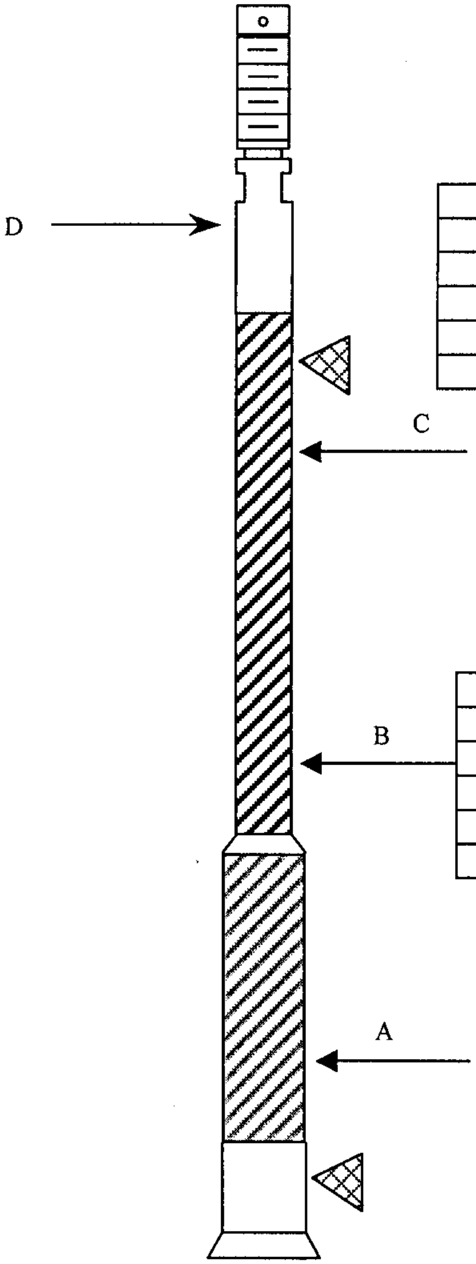
FILE: FPLPSV01.PPT Rev. 00

SIEMENS
WESTINGHOUSE

CUSTOMER: AEP
LOCATION/UNIT #: MITCHELL 1

BFPT STOP VALVE STEM RUNOUT

BB/FRAME: JOB NO.:
COMPONENT/S.O.: DWG.:



Right side (New Stem)

	A	B	C	D
0	0	0	0	0
90	0	0	0	0
180	0	0	0	0
270	0	0	0	0
TIR	0	0	0	0

	A	B	C	D
0				
90				
180				
270				
TIR				

FILE: IV008.PPT Rev. 01

Tool # Used ______________________ Cal. Due Date __________

As Found __________ Reading Taken By: _____J BROTHERS______________ Date: _9/26/01____

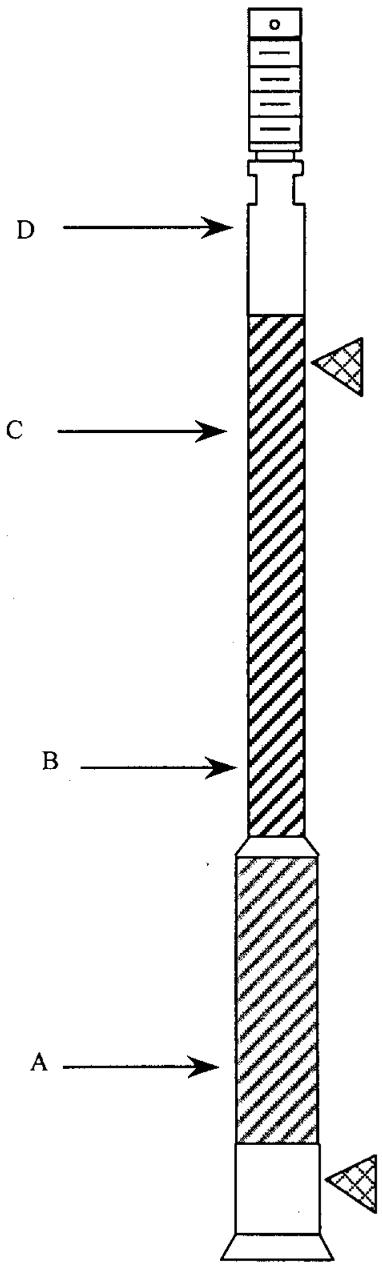
As Assembled ____X______ Reviewed By (W) Eng.: ______________________ Date: __________

SIEMENS
WESTINGHOUSE

CUSTOMER: AEP
LOCATION/UNIT #: MITCHELL 1

BFPT STOP VALVE STEM RUNOUT

BB/FRAME: JOB NO.:
COMPONENT/S.O.: DWG.:



Right side

	A	B	C	D
0	0	0	0	0
90	0	-3	-8	4
180	-1	-5	-10	7
270	0	-2	-2	2
TIR	1	5	10	7

Left side

	A	B	C	D
0	0	0	0	0
90	-2	-2	-3	2
180	-1	-3	-4	3
270	0	-1	-1	1
TIR	2	3	4	3

FILE: IV008.PPT Rev. 01

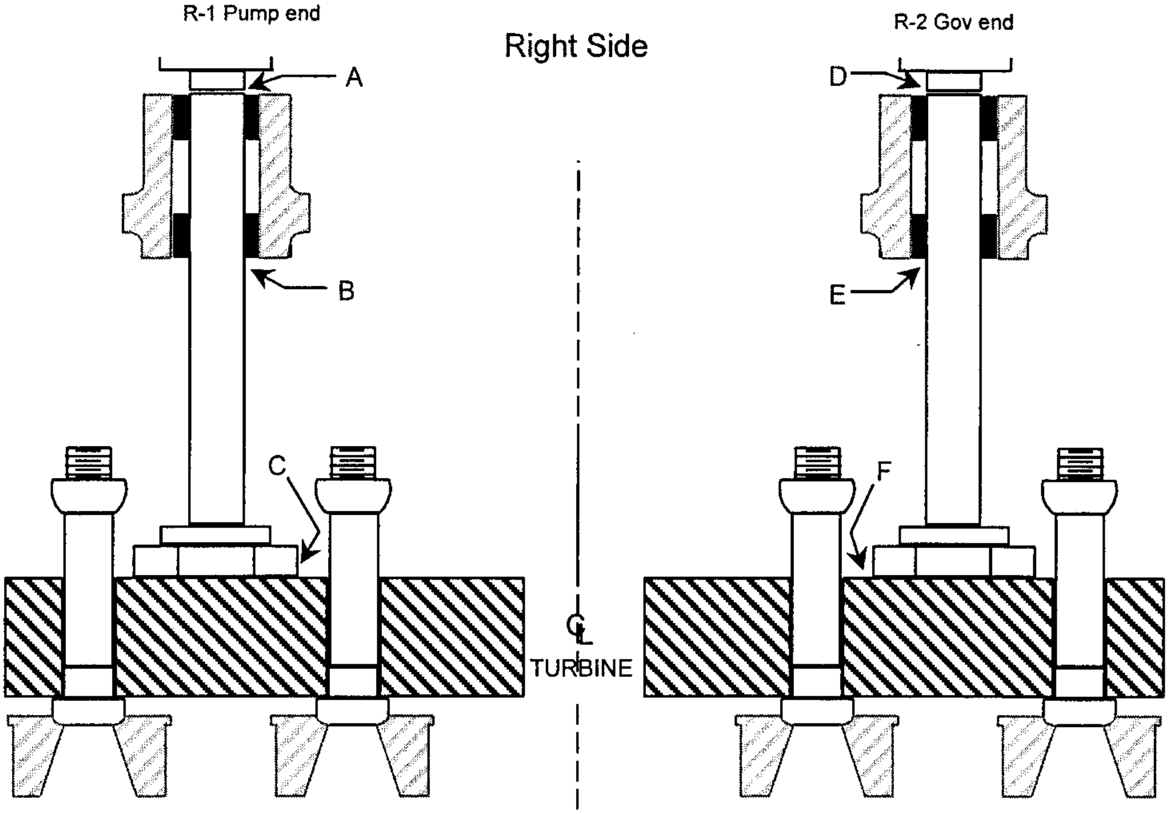
Tool # Used ________________________ Cal. Due Date __________

As Found ____X______ Reading Taken By: _____J BROTHERS______________ Date: _9/22/01____

As Assembled __________ Reviewed By (W) Eng.: ________________________ Date: __________

SIEMENS
WESTINGHOUSE

CUSTOMER:	AEP		
LOCATION/UNIT #:	MITCHELL 1		
BFPT GOVERNOR VALVE CLEARANCES			
BB/FRAME:	EMM32	JOB NO.:	
COMPONENT/S.O.:		DWG.:	



	DIM.	LIFT ROD O.D.	BUSHING I.D.	CLEARANCE	COMMENT	Design
R-1	A	1.248	1.257 / 1.253	.005 / .009		.005 / .007
	B	1.249	1.253	0.004		.005 / .007
	C				CLR UNDER NUT	
R-2	D	1.248	1.255 / 1.256	.007 / .008		.005 /.007
	E	1.248	1.253	0.005		.005 / .007
	F				CLR UNDER NUT	

Note: new stem installed on R-2, new bushing on "B" & "E"

Tool # Used ______________________________ Cal. Due Date __________

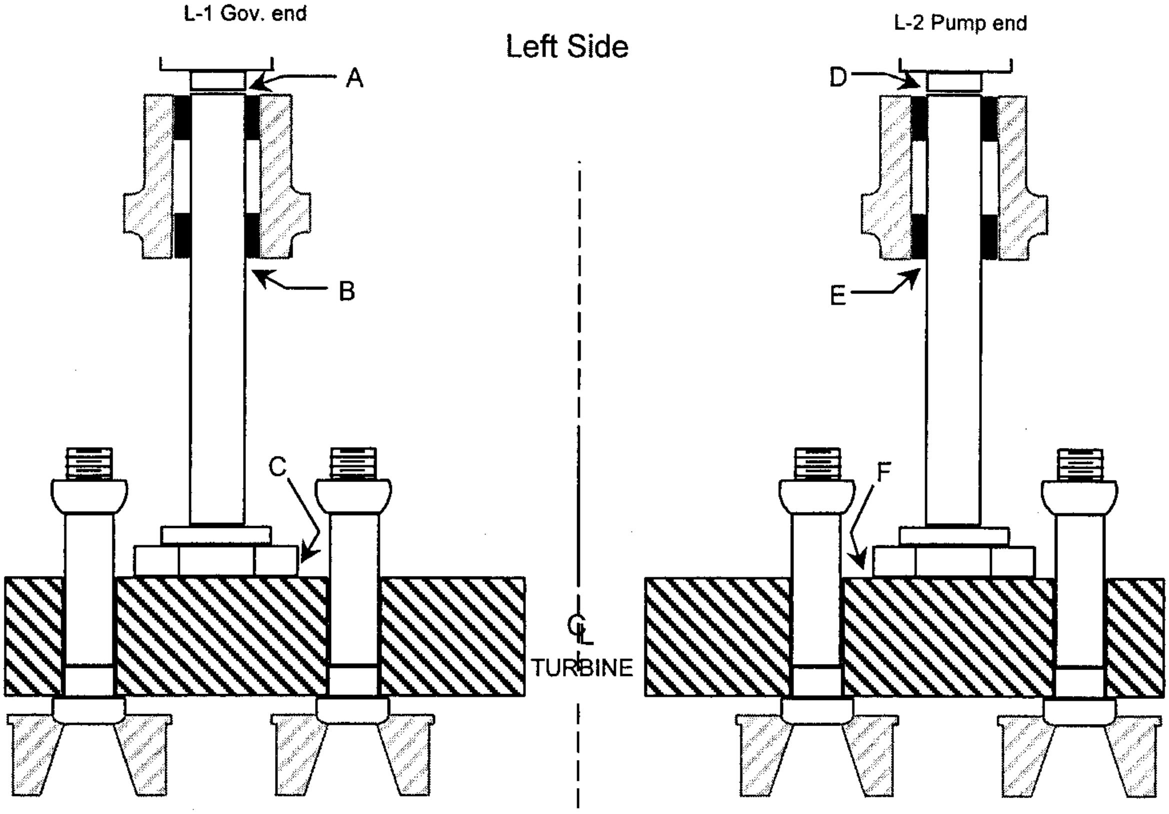
As Found __________ Reading Taken By: __ Brothers______________ Date: _10/2/01____

As Assembled ____X______ Reviewed By (W) Eng.: ______________________________ Date: __________

FILE: FPTV007.PPT Rev. 00

SIEMENS
WESTINGHOUSE

CUSTOMER:	AEP	
LOCATION/UNIT #:	MITCHELL 1	
BFPT GOVERNOR VALVE CLEARANCES		
BB/FRAME:	EMM32	JOB NO.:
COMPONENT/S.O.:		DWG.:



	DIM.	LIFT ROD O.D.	BUSHING I.D.	CLEARANCE	COMMENT	Design
L-1	A	1.247	1.251	0.004		.005 / .007
	B	1.247	1.254	0.007		.005 / .007
	C	☒	☒		CLR UNDER NUT	
L-2	D	1.247	1.253 / 1.260	.006 / .013		.005 /.007
	E	1.247	1.255 / 1.263	.008 / .016		.005 / .007
	F	☒	☒		CLR UNDER NUT	

Note: replaced "B" bushing & both stems

Tool # Used ______________________________ Cal. Due Date __________

As Found __________ Reading Taken By: __Brothers______________ Date: _10/2/01____

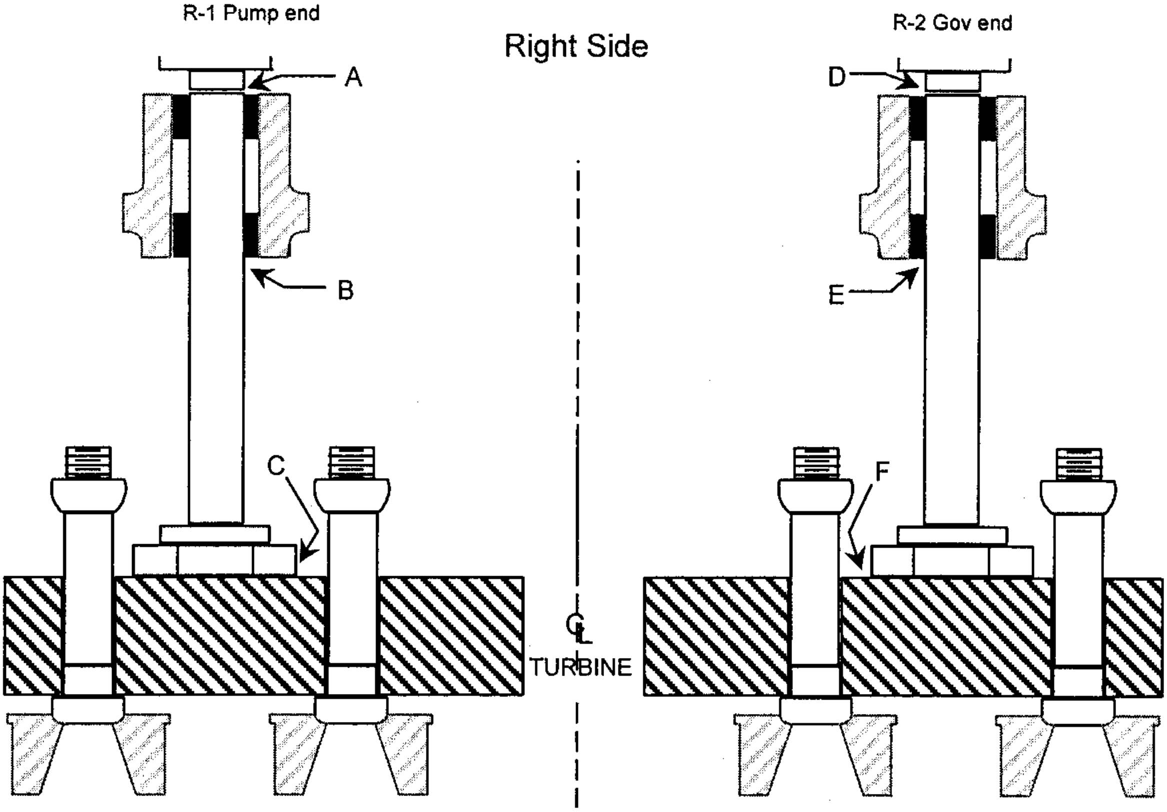
As Assembled ____X______ Reviewed By (W) Eng.: ______________________________ Date: __________

SIEMENS
WESTINGHOUSE

CUSTOMER: AEP
LOCATION/UNIT #: MITCHELL 1

BFPT GOVERNOR VALVE CLEARANCES

BB/FRAME: EMM32 JOB NO.:
COMPONENT/S.O.: DWG.:



	DIM.	LIFT ROD O.D.	BUSHING I.D.	CLEARANCE	COMMENT	Design
R-1	A	1.248	1.257 / 1.253	.005 / .009		.005 / .007
	B	1.249	1.283 / 1.269	.020 / .034	Bushing oval	.005 / .007
	C	☒	☒		CLR UNDER NUT	
R-2	D	1.247	1.255 / 1.256	.008 / .009		.005 /.007
	E	1.246	1.271	0.025		.005 / .007
	F	☒	☒		CLR UNDER NUT	

Tool # Used ____________ Cal. Due Date ________

As Found _____X_____ Reading Taken By: __Fankhauser / Riba ____________ Date: _9/22/01____

As Assembled ________ Reviewed By (W) Eng.: ________________ Date: ________

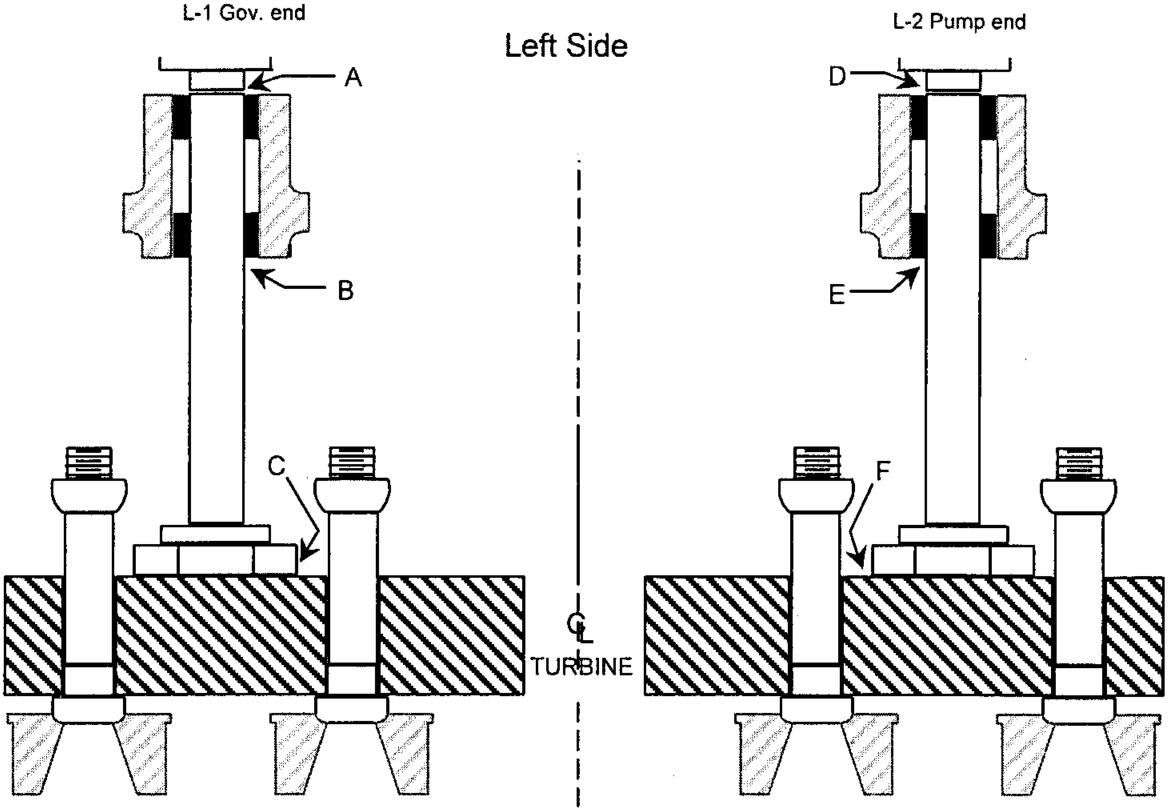
FILE: FPTV007.PPT Rev. 00

SIEMENS
WESTINGHOUSE

CUSTOMER: AEP
LOCATION/UNIT #: MITCHELL 1

BFPT GOVERNOR VALVE CLEARANCES

BB/FRAME: EMM32 JOB NO.:
COMPONENT/S.O.: DWG.:



	DIM.	LIFT ROD O.D.	BUSHING I.D.	CLEARANCE	COMMENT	Design
L-1	A	1.248	1.252	0.004		.005 / .007
	B	1.245	1.253 / 1.264	.008 / .019	Bushing oval	.005 / .007
	C	☒	☒		CLR UNDER NUT	
L-2	D	1.248	1.264 / 1.251	.003 / .006		.005 /.007
	E	1.242 / 1.247	1.253 / 1.262	.011/.020, .006/.015	Bushing oval	.005 / .007
	F	☒	☒		CLR UNDER NUT	

Tool # Used ______________________ Cal. Due Date __________

As Found _____X_____ Reading Taken By: __Fankhauser / Riba ______________ Date: _9/22/01____

As Assembled __________ Reviewed By (W) Eng.: ______________________________ Date: __________

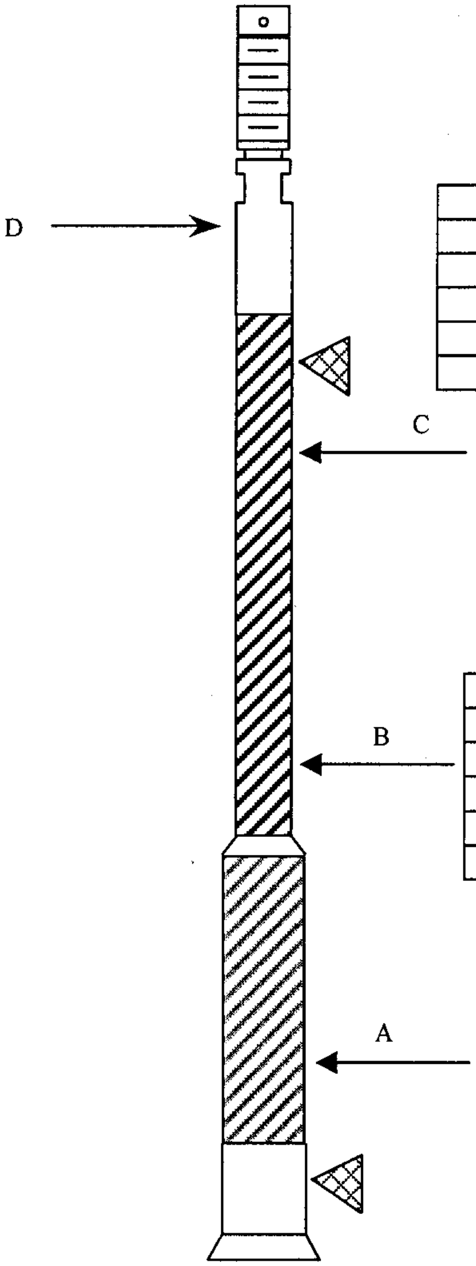
FILE: FPTV007.PPT Rev. 00

SIEMENS
WESTINGHOUSE

CUSTOMER: AEP
LOCATION/UNIT #: MITCHELL 1

BFPT GOV VALVE STEM RUNOUT

BB/FRAME: JOB NO.:
COMPONENT/S.O.: DWG.:



L-1 Left side (New Stem)

	A	B	C	D
0	0	0	0	0
90	0	0	0	0
180	0	0	0	-1
270	0	0	0	0
TIR	0	0	0	0

R-2 Right side (New Stem)

	A	B	C	D
0	0	0	0	0
90	0	0	0	0
180	0	0	0	0
270	0	0	0	0
TIR	0	0	0	0

FILE: IV008.PPT Rev. 01

Tool # Used ______________ Cal. Due Date __________

As Found __________ Reading Taken By: _____J BROTHERS______________ Date: _9/26/01____

As Assembled ____X______ Reviewed By (W) Eng.: ______________ Date: __________

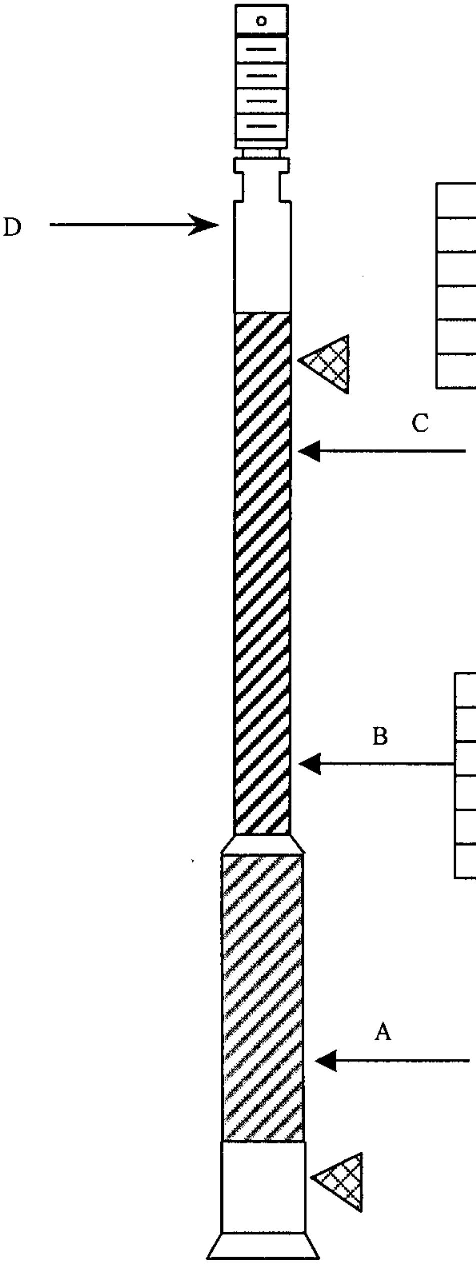
SIEMENS
WESTINGHOUSE

CUSTOMER: AEP
LOCATION/UNIT #: MITCHELL 1

BFPT GOV VALVE STEM RUNOUT

BB/FRAME:
JOB NO.:
COMPONENT/S.O.:
DWG.:

L-2 Left side (New Stem)



	A	B	C	D
0	0	0	0	0
90	0	0	0	0
180	0	0	0	0
270	0	0	0	0
TIR	0	0	0	0

	A	B	C	D
0				
90				
180				
270				
TIR				

FILE: IV008.PPT Rev. 01

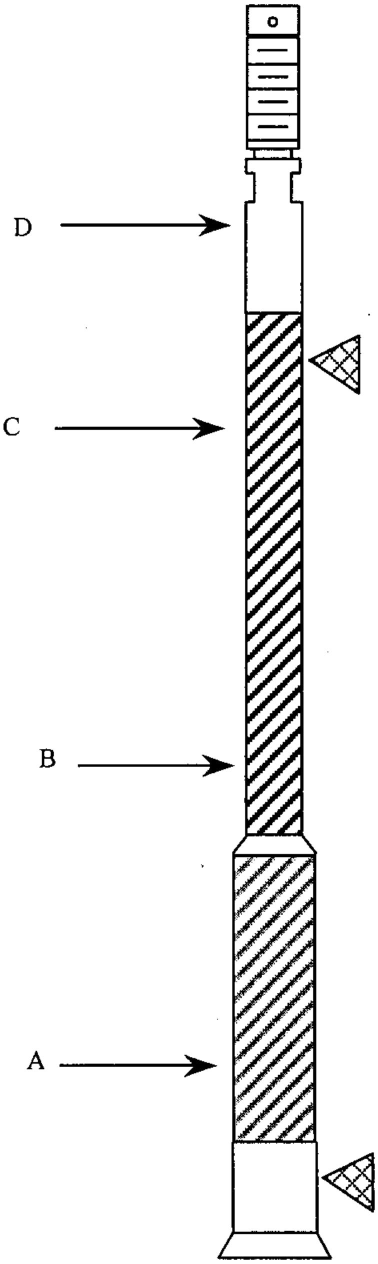
Tool # Used ______________________________ Cal. Due Date __________

As Found __________ Reading Taken By: _____J BROTHERS______________ Date: _9/26/01____

As Assembled ____X______ Reviewed By (W) Eng.: ____________________________ Date: __________

SIEMENS
WESTINGHOUSE

CUSTOMER: AEP	
LOCATION/UNIT #: MITCHELL 1	
BFPT GOV VALVE STEM RUNOUT	
BB/FRAME:	JOB NO.:
COMPONENT/S.O.:	DWG.:



RS - L-2

	A	B	C	D
0	0	0	0	0
90	1	3	0	-1
180	0	4	-1	0
270	-1	1	0	0
TIR	2	4	1	1

RS - L-1

	A	B	C	D
0	0	0	0	0
90	0	0	-2	0
180	-1	-2	-5	1
270	-1	-2	-2	1
TIR	1	2	5	1

FILE: IV008.PPT Rev. 01

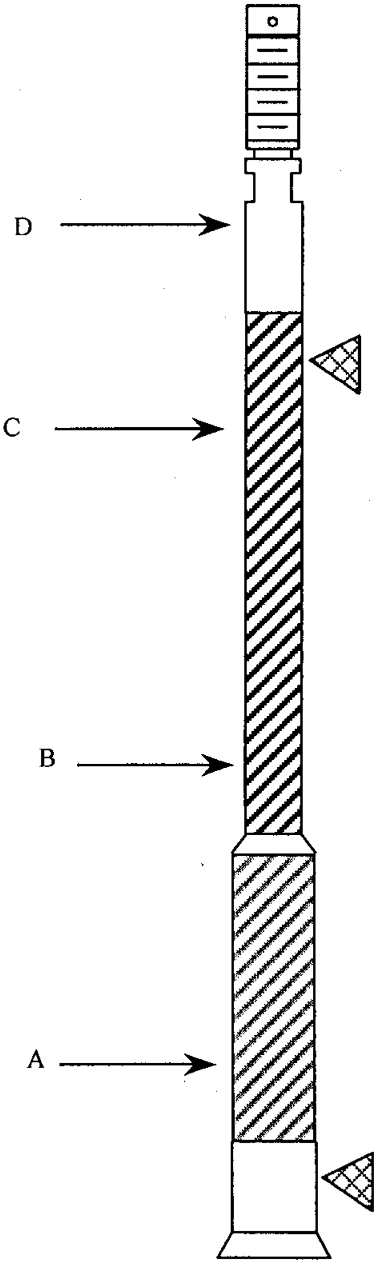
Tool # Used ____________ Cal. Due Date ____________

As Found ____X______ Reading Taken By: _____J BROTHERS______________ Date: _9/22/01____

As Assembled ____________ Reviewed By (W) Eng.: ____________ Date: ____________

SIEMENS
WESTINGHOUSE

CUSTOMER: AEP	
LOCATION/UNIT #: MITCHELL 1	
BFPT GOV VALVE STEM RUNOUT	
BB/FRAME:	JOB NO.:
COMPONENT/S.O.:	DWG.:



LS - L-2

	A	B	C	D
0	0	0	0	0
90	-4	-5	-11	-6
180	0	5	0	-1
270	5	10	10	5
TIR	9	15	21	11

LS - L-1

	A	B	C	D
0	0	0	0	0
90	0	4	8	9
180	-2	-4	-1	0
270	-3	-9	-11	-10
TIR	3	13	19	19

FILE: IV008.PPT Rev. 01

Tool # Used ____________________ Cal. Due Date __________

As Found ____X______ Reading Taken By: _____J BROTHERS______________ Date: _9/22/01____

As Assembled __________ Reviewed By (W) Eng.: ____________________ Date: __________

BFP Turbine Alignment

Centerline Alignment

Rotor axial and radial positions were taken at T-1 and T-2 oil deflector fits prior to the rotor being removed. These rotor positions served as our set points for centerline alignment.

The BFP turbine was aligned using the tightwire method. A set of desired positions were provided for the alignment by Jim Cable of the turbine engineering group. These desired positions were calculated from prior tops-on tops-off tightwire alignment and prior out-of-round data. A copy of the desired diaphragm positions is included with this section.

The diaphragms were installed and were pushed to the left. The diaphragm side movement was checked and recorded.

A tightwire was strung and was set at the oil deflector fit set points. All of the diaphragms needed adjustment and were removed from the shell. These diaphragms are supported by brass radial crush pins at four locations on the periphery. These crush pins had to be removed and replaced to adjust the positioning of the diaphragms.

All of the diaphragms were adjusted so that they were aligned to the desired position within +/- 0.003" and that their side movement was less than 0.004".

After all of the diaphragms were aligned to the tightwire, drop checks were taken on the upper and lower diaphragm halves to determine the clearance of the top radial crush pin. The radial clearance was set at 0.010" minimum for each diaphragm.

After the rotor was installed, the rotor radial positions were checked and agreed with the tightwire set points within 1 mil.

Coupling Alignment

A new coupling hub was installed on the BFP and BFP turbine. The hub was given a 0.004" shrink fit with respect to the shaft.

A sixteen point coupling check was done on the BFP coupling. The pump was moved and shimmed to correct all misalignment.

After the alignment was completed, the over-speed plate was installed on the turbine side of the coupling and the runout of the plate was adjusted to be zero.

After first roll up of the turbine to check vibration and overspeed, the over-speed plate was removed and the coupling spool piece was installed. New grease was used on the coupling and the operation of the coupling engager was checked and operated properly.

Tightwire Readings

Plant ML Unit 1 Turbine Serial No.

Date 10/5/01 As Found/Final Final Prepared by K. Riley

LOCATION	Distance from TE	Sag Mils	Raw Data Readings In Inches			Relative Position (Sag Corrected in mils)			True Position	
									Elev	Horz
T-1 Thrust Runner - PE	16	2.2				**0**		**1**		
							-15			
Turb End Gland - Row 1	33	3.9	0.208		0.219	0		11	2	-6
				0.212			8			
Stage 6 TE	55	5.4	0.478		0.479	0		1	2	-1
				0.475			2			
Stage 5 TE	61	5.6	0.594		0.599	0		5	0	-3
				0.591			3			
Stage 4 TE	67	5.8	0.611		0.606	5		0	3	3
				0.606			6			
Stage 3 TE	71	5.9	0.791		0.794	0		3	2	-2
				0.789			4			
Stage 2 TE	75	5.9	0.297		0.299	0		2	0	-1
				0.292			1			
Stage 2 PE	64	5.7	0.299		0.297	2		0	0	1
				0.292			1			
Stage 3 PE	60	5.6	0.786		0.786	0		0	4	0
				0.784			4			
Stage 4 PE	56	5.4	0.590		0.592	0		2	1	-1
				0.587			2			
Stage 5 PE	50	5.1	0.589		0.587	2		0	3	1
				0.586			4			
Stage 6 PE	44	4.8	0.468		0.474	0		6	3	-3
				0.469			6			
Pump End Gland - Row 3	24	3.1	0.218		0.205	13		0	-6	7
				0.202			0			
T-2 Oil Deflector Fit	21	2.7				**1**		**0**		
							-6			
Total Length of Wire	158	0.0								

Tightwire Readings

DESIRED POSITIONS

Plant ML Unit 1 Turbine Serial No.

Date 10/1/01 As Found/Final Prepared by J. Cable

LOCATION	Distance from TE	Sag Mils	Raw Data Readings In Inches			Relative Position (Sag Corrected in mils)			True Position	
									Elev	Horz
T-1 Thrust Runner - PE	16	2.2				**0**		**1**		
							-15			
Turb End Gland - Row 1	33	3.9				0		0		
							0			
Stage 6 TE	55	5.4				0		0		
							2			
Stage 5 TE	61	5.6				0		0		
							2			
Stage 4 TE	67	5.8				0		0		
							3			
Stage 3 TE	71	5.9				0		0		
							2			
Stage 2 TE	75	5.9				0		0		
							1			
Stage 2 PE	64	5.7				0		0		
							1			
Stage 3 PE	60	5.6				0		0		
							2			
Stage 4 PE	56	5.4				0		0		
							3			
Stage 5 PE	50	5.1				0		0		
							2			
Stage 6 PE	44	4.8				0		0		
							2			
Pump End Gland - Row 3	24	3.1				0		0		
							0			
T-2 Oil Deflector Fit	21	2.7				**1**		**0**		
							-7			
Total Length of Wire	158	0.0								

Diaphragm Joint Check

Bolted Diaphragms

Plant & Unit ML #1

Prepared by J. Brothers

Date(m/d/y) 10/5/01

As Found / Final Data As Found

Turbine S/N:

Data Final
(As Found/Final)

Section BFPT
(HP/LP)

Levelness Maximum 1 Mils/Inch
Centering Pin Clearance Max. 3 Mils
Centering Pin Clearance Min. 1 Mils

Notes:
1. Diaphragm above casing record as PLUS (+).
2. Diaphragm below casing record as MINUS (-).

Diaphragm Drop Checks

	Lower Half		Upper Half		Total Drop		
Stage	**Left Mils**	**Right Mils**	**Left Mils**	**Right Mils**	**Measured Mils**	**Desired Mils**	**Amount to Machine**
6 TE	26	16	24	-104	**-19**	-10	**OK**
5 TE	-19	-17	-18	20	**-17**	-10	**OK**
4 TE	-13	-6	24	-30	**-13**	-10	**OK**
3 TE	21	10	-45	-3	**-9**	-10	**OK**
2 TE	19	2	-36	-7	**-11**	-10	**OK**
2 PE	86	54	-110	-40	**-5**	-10	**OK**
3 PE	24	20	-30	-25	**-6**	-10	**OK**
4 PE	30	6	-16	-30	**-5**	-10	**OK**
5 PE	20	10	-39	-7	**-8**	-10	**OK**
6 PE	-5	19	-4	-23	**-7**	-10	**OK**

Alignment
Couplings

Plant ML Unit 1 Turbine Serial No. ____

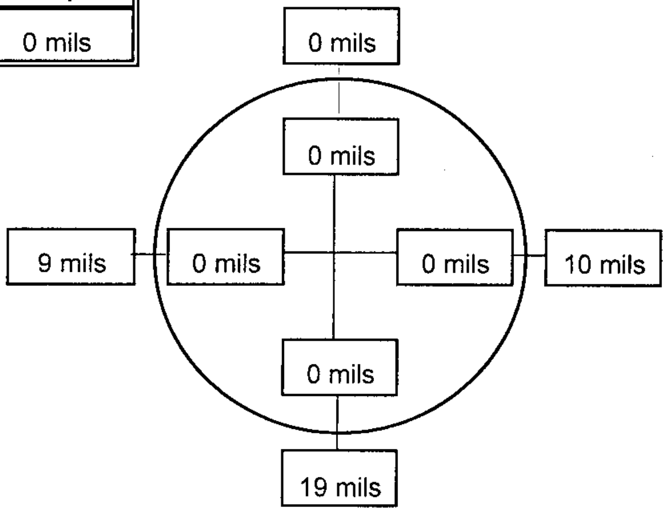
Date 10/29/01 As Found/Final Data Final Prepared by D. Robinson

Coupling BFP Sweep Diameter ____ Indicator Mounted on Turb

Alignment Readings

Position	**Top**	**Left**	**Bottom**	**Right**	**Top**
Rim (Mils)	0 mils	9 mils	19 mils	10 mils	0 mils
Face 0°	13.063"	13.063"	13.063"	13.063"	
Face 90°	13.063"	13.063"	13.063"	13.063"	
Face 180°	13.063"	13.063"	13.063"	13.064"	
Face 270°	13.063"	13.063"	13.063"	13.063"	
Average	13.063"	13.063"	13.063"	13.063"	
Relative	0 mils	0 mils	0 mils	0 mils	

Check	**Face**	**Rim**
Top + Bottom=	0 mils	19 mils
Right + Left =	0 mils	19 mils
Difference=	0 mils	0 mils



Rim Recheck (If Necessary)

Position	**Top**	**Left**	**Bottom**	**Right**	**Top**
Rim (Mils)					

Comments:	

Boiler Feed Pump

The boiler feed pump was disassembled and inspected under the supervision of Steve Burford of CMS. His report is attached to this section.

In summary, the boiler feed pump was disassembled and the rotating element was removed from the casing. A large water cut was found across the gasket fit for the barrel. This area was under cut and weld repaired by CMS personnel. The gasket surface was restored to its original dimension.

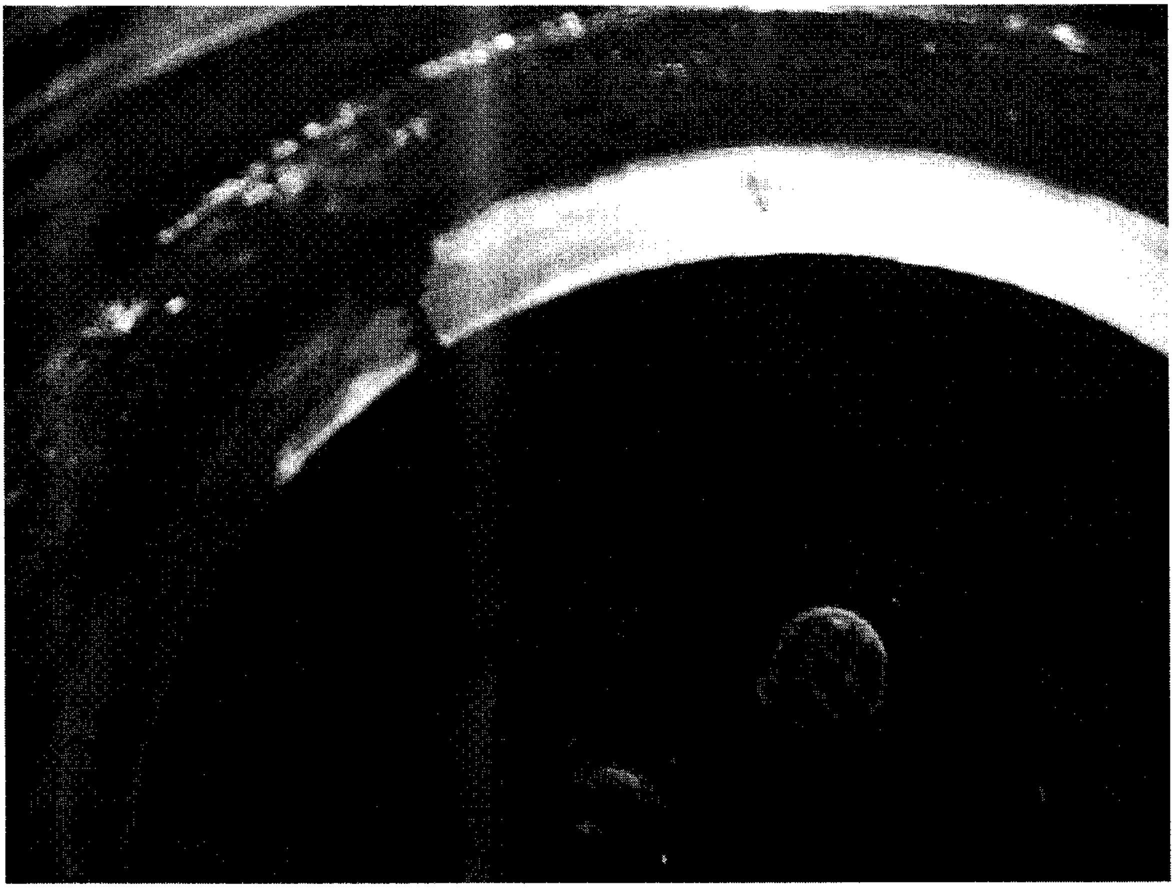
A spare rotating element was installed in the feed pump. New bearings were installed to suit the spare element.

The head was reinstalled and new super-nuts were used on the outer head. The super nuts were torqued to the manufacturers specifications. The rotating element turned freely by hand when reinstalled. A new coupling hub was installed and the pump was aligned to the turbine.

See attached report from Steve Burford in this section.

Mitchell Unit 1 – Boiler Feed Pump

Fall 2001 Outage

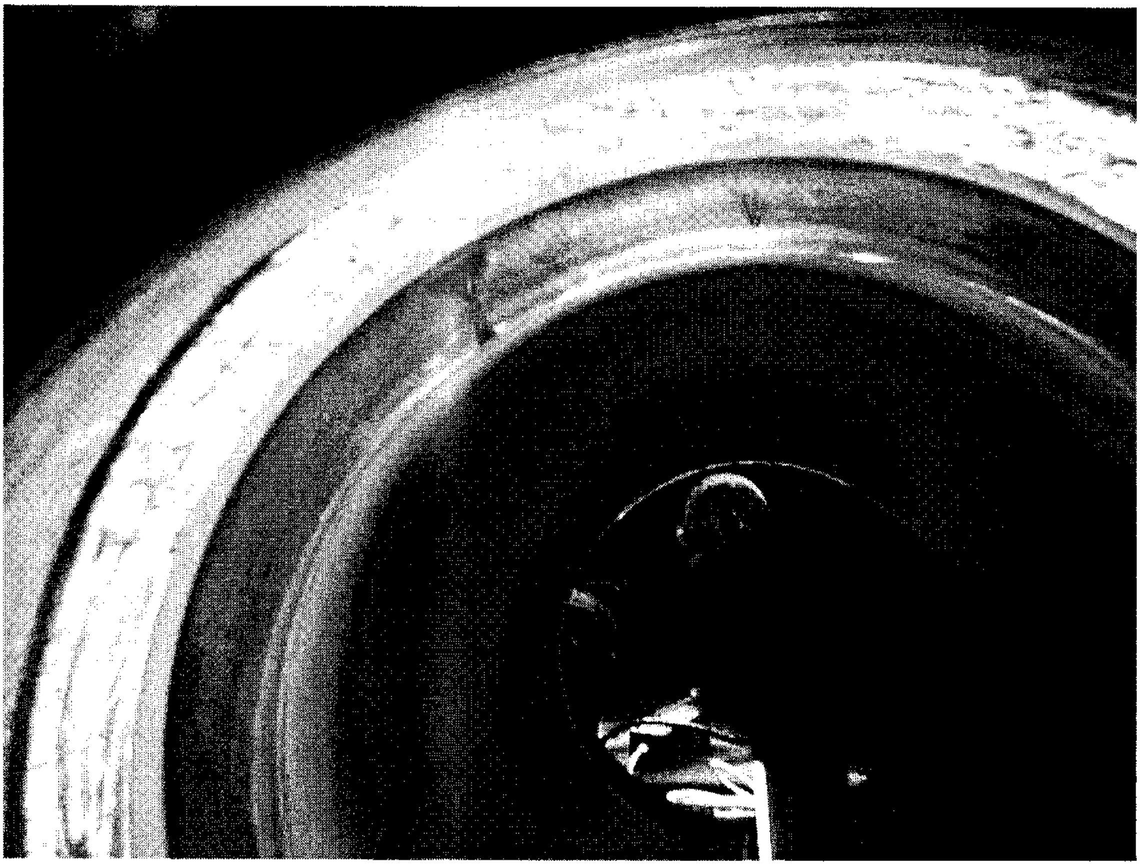


Comments:

This photo shows the water cutting across the gasket fit in the boiler feed pump. This area was cut back, weld repaired and machined true by CMS personnel.

Mitchell Unit 1 – Boiler Feed Pump

Fall 2001 Outage



Comments:

This photo shows the water cutting across the gasket fit in the boiler feed pump. This area was cut back, weld repaired and machined true by CMS personnel.

STEVE BURFORD OCT 2001

① MITCHEL 1 130 CHT

DISSASSEMBLED PUMP + INSPECTED PARTS.

BARREL WAS MEASURED:

HEAD FIT X 39.962^5 HEAD OD 39.963
Y 39.959^5 39.963
Z 39.960

O.B. STUFFING BOX: X-ID-17.002 ID X 17.190
Y-ID-17.000 ID Y 17.189
X-OD-17.184 ORING 16.191
Y-OD 17.185

IB STUFFING BOX: X-ID-17.187^5 ORING FIT 17.185
Y-ID-17.192

OD-X-17.185 16.193 ORING FIT
OD-Y 17.185

BARREL: PUMP TO BARREL ID X 33.969^5
ID Y 33.971
PUMP: OD. 33.968

ALL FITS WERE IN GOOD SHAPE EXCEPT MIDDLE FACE + GASKET FIT. SEVERAL CUTS IN BOTH. ONE CUT AT 11:00 WAS 1/2 INCH DEEP.

BARREL WAS UNDERCUT + WELDED. THE FIT WAS RESTORED TO 28.000 FROM FACE. (SPEC.)

② MITCHEL 1 130 CH [illegible] 4

BARREL WAS CIEANED AND ALL FITS WERE STONED. PUMA WAS INSTALLED IN BARREL, HEAD WAS INSTALLED AND BROUGHT UP TO METAL TO METAL. STUDS WERE STRETCHED (.038 SPEC) A NEW BALANCE DRUM SIEEVE WAS INSTALLED IN THE HEAD. NEW BOLTS WERE USED + TORQUED TO 400 FT/LBS BOLTS WERE TACKED (309 STAINLESS)

BALANCE DRUM SLEVE 9.381⁵
BALANCE DRUM OD. 9.359⁵
CLEARENCE .022⁵

BALANCE DRUM TAIL WAS MACHINED TO PROPER CLEARENE IN RELATON TO LAST STAGE IMPELLER (MIN .030 WITH SHIMS ON DRUM) GROOVE TO LAST STAGE IMPELLER 5.890 (.030 CLEARENCE .150 SHIMS)
MACHINE DRUM THICKNESS 5.700

PUMP WAS FLOATED + END LIFTED IN FLOOR

.364 FLOAT IB. - 022 OB. - 022

AFTER INSTALLED + HEAD UP TIGHT READINGS WERE TAKEN FARTHER OUT
364 FLOAT IB .032 OB .038

DRUM WAS INSTALLED WITH 5 - .090 SHIMS TOTAL 364 REDUCED TO .175 FROM IB END.

COMPENSATOR GROUP 6 GASKETS (.182) + 6 WASHERS (.061) COMPRESSION ON EACH GASKET .030
ADDED ONE WASHER MORE THAN REMOVED

SUPER BOLTS. 200 - 210 FT/LBS ACHIEVED PROPER STRETCH.
STETCH SHEET ATTACHED

③ MITCHEL 1 1/30 [illegible] 4

STUFFING BOXES WERE REBUILT.
REPLACED FLOATING SEALS WITH SERRATED
BUSHINGS. COMPRESSION RINGS WERE MODIFIED
(ANTI ROTATION PIN ADDED) BOLTS WERE
TORQUED TO 275 FT/LBS THIS WAS METAL TO
METAL BETWEEN RINGS + BOXES
BOLTS WERE SECURED WITH CLIPS

THE BORES OF BOTH BUSHINGS WERE
HONED TO IB 8.001 — .015 CLEARANCE
OB 8.002 - .016 CLEARENCE
SPEC. .014 - .016 CLEARENCE
O.D. SHAFT SLEEVES 7.986

④ MITCHEL 1 150 - 4

NEW Bearings were INSTALLED
CLEARENCE (.0095)
BEARINGS WERE SET AT ½ TOTAL LIFT

I.B. - .016 - SET .008
O.B - .018 - SET .009

ADDED .060 SHIM TO DRUM TOTAL .240.
THIS WAS TO REDUCE NUMBER OF SHIMS
ON RUNNER. AND CENTER PUMP.

TOTAL FLOAT WAS .364 WITH DRUM SET
TOTAL WAS .176 FROM IB END

RUNNER WAS SHIMMED (.226) THIS PUT
DRUM .003 OFF BALANCE DRUM SLEEVE.

PUMP WAS ROTATED 2 TIMES (TURNED VERY
EASLY) BY HAND.

BEARING HOUSING WERE REAMED AND PINS INSTALLED

STEVE BURFORD
OCT 2001

Thrust Clearance is 0.025"

STUD ELONGATION RECORD ---------------- CUSTOMER ---- MITCHEL ---- DATE ---- OCT. 2001

NYO ---------------- TYPE PUMP ---- 130 CHTA 4 ---- SERIAL NO. ------------ STUD SIZE ---- 5"

Stud No.	Cold Stud	Impact Reading	Stretch	Flats Required	Cold Stud After Heat	Stretch
1A 1	.910	.873	037			
B 2	.886	.848	038			
2A 3	.983	.937	044			
B 4	.970	.931	.039			
3A 5	BAD	END	TORQUED	SAME AS	OTHER 17	
B 6	.920	.881	.039			
4A 7	.943	905	.038			
B 8	.964	.924	.040			
5A 9	.947	.905	.042			
B 10	.962	.916	.045			
6A 11	.905	.866	.039			
B 12	.913	.874	.039			
7A 13	.914	.870	.044			
B 14	.921	.879	.042			
8A 15	.939	.900	.039			
B 16	.929	.890	.039			
9A 17	.821	.785	.036			
B 18	.922	.880	.042			

[redacted]

STEVE BURFO

This Section left blank for insertion of the Westinghouse Start-up and balancing report

ULTRASONIC TEST REPORT

AMERICAN ELECRIC POWER
Central Machine Shop
3100 MacCorkle Avenue, Building 309
South Charleston, West Virginia 25303

CMS NUMBER ____________

ACCOUNT NUMBER ____________ DATE 9-18-01

1. IDENTIFICATION

Facility Mitchell PC/SN Unit 1

Item Turbine Stud Bolts

2. TECHNIQUE

☒ Single Transducer ☐ Dual Transducer

☒ Straight Beam ☐ Angle Beam

Frequency ☐ 1MH ☒ 2.5MH ☐ 3.5MH ☐ 5MH ☐ 10MH ☐ ____

Search Angle ☒ 90° ☐ 70° ☐ 60° ☐ 45°

Type of Couplant Exosen 20

Diameter ☐ .250 ☐ .375 ☐ .500 ☒ .750 ☐ 1.000 ☐

Test Unit Kraut Kramer USK7D

3. CALIBRATION STANDARD: ☐ Drilled Hole ☐ V-Notch ☐ IIW Block ☐ Other ____

4. INSPECTION PROCEDURE: MI-1-5-2-4

5. INSPECTION SPECIFICATIONS: MI-1-5-2-4

YPE OF INDICATION:

☐ Crack ☐ Lack of Bond ☐ Corrosion/Erosion ☐ Internal Voids ☐ Other ____

7. SKETCH/DESCRIPTION:

An ultrasonic inspection was performed to the stud bolts of different turbine componets. See attached sheet for location and results.

NSPECTION PERFORMED BY: Sealey & Cobb 9-18-01
AEP Level II MT Inspector Signature Date

9. APPROVED BY: ____________ ____________
NDE Supervisor Signature Date

cms 99

Mitchell Unit 1 Stud Bolts

Throttle Valves (4) Stud Bolts - No Cracked Bolts
Governor Valves (8) Stud Bolts - No Cracked Bolts
1st Reheat (Left & Right) Stop Valves - No Cracked Bolts
1st Reheat (Left & Right) Intercept Valves - No Cracked Bolts
2nd Reheat (4) Left & Right Stop Valves - No Cracked Bolts
2nd Reheat (4) Left & Right Intercept Valves - No Cracked Bolts
1st & 2nd Reheat Stop Flapper Valve Stud Bolts - No Cracked Bolts

"B" L.P. Turbine Governor & Generator Steam Flow Guide Bolts - No Cracks
H.P. - 1st Reheat Outer Shell Stud Bolts - No Cracks
"A" L.P. Rotor Inner Casing Bolts - No Cracks

A, C, D, E & F Coupling Bolts - No Cracks

"A" L.P. L/H Dummy Studs - No Cracks
" P. L/H Dummy Studs - No Cracks
HP L/H Dummy Studs - No Cracks

MAGNETIC PARTICLE INSPECTION REPORT

APPALACHIAN POWER COMPANY
CENTRAL MACHINE SHOP
3100 MacCorkle Avenue, Bldg. 309
South Charleston, West Virginia 25303

CMS NO. ____________

DATE 9-18-01

ACCOUNT NO. ____________

1. IDENTIFICATION

Facility Mitchell

Item "B" L.P. Turbine Spindle

PC/SN Unit 1

2. TECHNIQUE - Dry Powder ☐ Wet Fluorescent ☒

Non Fluorescent ☐

3. EQUIPMENT - Coil ☒ Prods ☐ Yoke ☐ Clamps ☐

4. CURRENT TYPE - AC ☒ DC ☐

5. AMP TURNS - 5,000

6. INSPECTION PROCEDURE MI-1-5-2-3

7. INSPECTION SPECIFICATIONS MI-1-5-2-3

8 TYPE OF INDICATION FOUND

1. Crack 2. Linear Surface 3. Linear Subsurface 4. Undercut 5. Non Relevant

9. SKETCH/DESCRIPTION

A magnetic particle inspection was performed to the L-0 stage blades on the governor & generator ends of the rotor. No crack indications were present.

0. INSPECTION PERFORMED BY:
AEP Level II MT Inspector

SIGNATURE Dudley A Cobb

DATE 9-18-01

11. APPROVED BY:
NDE Supervisor

SIGNATURE ____________

DATE ____________

ULTRASONIC TEST REPORT

AMERICAN ELECRIC POWER
Central Machine Shop
3100 MacCorkle Avenue, Building 309
South Charleston, West Virginia 25303

CMS NUMBER __________

ACCOUNT NUMBER __________ DATE 9-19-01

---

1. IDENTIFICATION

Facility Mitchell PC/SN Unit 1

Item Turbine Bearings

2. TECHNIQUE

☒ Single Transducer ☐ Dual Transducer

☒ Straight Beam ☐ Angle Beam

Frequency ☐ 1MH ☐ 2.5MH ☐ 3.5MH ☒ 5MH ☐ 10MH ☐ ____

Search Angle ☒ 90° ☐ 70° ☐ 60° ☐ 45°

Type of Couplant Exosen 20

Diameter ☒ .250 ☐ .375 ☐ .500 ☐ .750 ☐ 1.000 ☐

Test Unit Kraut Kramer USK7D

3. CALIBRATION STANDARD: ☐ Drilled Hole ☐ V-Notch ☐ IIW Block ☐ Other ____

4. INSPECTION PROCEDURE: MI-1-5-2-4

5. INSPECTION SPECIFICATIONS: MI-1-5-2-4

6. TYPE OF INDICATION:

☐ Crack ☐ Lack of Bond ☐ Corrosion/Erosion ☐ Internal Voids ☐ Other ____

---

7. SKETCH/DESCRIPTION:

An ultrasonic inspection was performed to the following bearings to determine the percentage of babbit bond. See attached sheet for results.

8. INSPECTION PERFORMED BY: Doug Gurley 9-19-01
AEP Level II MT Inspector Signature Date

9. APPROVED BY: __________ ______
NDE Supervisor Signature Date

cms 99

Mitchell Unit Turbine Bearings

Turbines

3 Bearing - U/H - Bond OK
L/H - Bond OK

4 Bearing - U/H - Bond - OK
L/H - Bond - OK

7 Bearing - U/H - Bond - OK
L/H - Bond - OK

8 Bearing - U/H - Bond - OK
L/H - Bond - OK

H.P. - 1st Reheat - Thrust Pads (16) - Bond - OK

Boiler Feed Pump

Pump Bearings - Outboard End - U/H - Bond - OK
L/H - Bond - OK

Inboard End - U/H - Bond - OK
L/H - Bond - OK

BFP Turbine Bearings - Outboard End - U/H - Bond - OK
L/H - Bond - OK

Inboard End - U/H - Bond - OK
L/H - Bond - OK

BFP Turbine Thrust Pads (8) - Bond - OK.

All of the above bearings has between 98% to 100% bond.

LIQUID PENETRANT INSPECTION REPORT

AMERICAN ELECTRIC POWER
CENTRAL MACHINE SHOP
3100 MacCorkle Ave. Building 309
South Charleston, WV 25303

1S NUMBER
COUNT NUMBER
DATE 9-25-01

1. IDENTIFICATION:

Facility Mitchell
PC/SN Throttle Valve Body Stellite Seats
Item Unit 1

2. MATERIAL: ☐ Ferrous ☒ Nonferrous

3. TECHNIQUE: ☒ Visible Dye ☐ Fluorescent ☐ Water Washable

4. MFG/TYPE: Cleaner Penetrant Developer

5. INSPECTION PROCEDURE: MI-1-5-2-2

6. INSPECTION SPECIFICATIONS: MI-1-5-2-2

7. TEMPERATURE: Ambient Surface

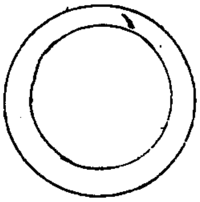
8. TYPE OF INDICATION:

☐ Crack ☐ Linear ☐ Inline Porosity ☐ Rounded ☐ Other

6. SKETCH/DESCRIPTION:

An inspection was performed to the stellite seats inside of the north-south left and right throttle valves. Results are as follows

North Right Stellite Seat - 1/4" long crack at top right of stellite



All other seats are OK

INSPECTION PERFORMED BY: Doug Tinley
AEP Level II MT Inspector Signature
9-25-01
Date

11. APPROVED BY:
NDE Supervisor Signature
Date

CMS 109

LIQUID PENETRANT INSPECTION REPORT

AMERICAN ELECTRIC POWER
CENTRAL MACHINE SHOP
3100 MacCorkle Ave. Building 309
South Charleston, WV 25303

IS NUMBER ____________
ACCOUNT NUMBER ____________ DATE 9-25-01

1. IDENTIFICATION:

Facility Mitchell
PC/SN Unit 1
Item Governor Valve Chest Seats

2. MATERIAL:

☐ Ferrous ☒ Nonferrous

3. TECHNIQUE:

☒ Visible Dye ☐ Fluorescent ☐ Water Washable

4. MFG/TYPE:

Cleaner ____________ Penetrant ____________ Developer ____________

5. INSPECTION PROCEDURE: MI-1-5-2-2

6. INSPECTION SPECIFICATIONS: MI-1-5-2-2

7. TEMPERATURE:

Ambient ____________ Surface ____________

8. TYPE OF INDICATION:

☐ Crack ☐ Linear ☐ Inline Porosity ☐ Rounded ☐ Other ____________

6. SKETCH/DESCRIPTION:

An inspection was performed to the (8) seats inside of the right and left governor valve chests. These seat are not stellite. No crack indications were present, but seats had other damage that will be repaired.

INSPECTION PERFORMED BY: Doug Graley 9-25-01
AEP Level II MT Inspector Signature Date

11. APPROVED BY: ____________ ____________
NDE Supervisor Signature Date

LIQUID PENETRANT INSPECTION REPORT

AMERICAN ELECTRIC POWER
CENTRAL MACHINE SHOP
3100 MacCorkle Ave. Building 309
South Charleston, WV 25303

IS NUMBER ____________
ACCOUNT NUMBER ____________
DATE 9-25-01

1. IDENTIFICATION:

Facility Mitchell
PC/SN Unit 1
Item L-1 & L-0 Upper & Lower Blade Rings

2. MATERIAL:

☐ Ferrous ☒ Nonferrous

3. TECHNIQUE: ☐ Visible Dye ☐ Fluorescent ☐ Water Washable

4. MFG/TYPE: Cleaner ____________ Penetrant ____________ Developer ____________

5. INSPECTION PROCEDURE: ____________
6. INSPECTION SPECIFICATIONS: ____________
7. TEMPERATURE: Ambient ____________ Surface ____________

8. TYPE OF INDICATION:

☐ Crack ☐ Linear ☐ Inline Porosity ☐ Rounded ☐ Other ____________

6. SKETCH/DESCRIPTION:

A visual inspection was performed to the governor and generator, upper & lower L-1 and L-0 blade rings after they were blast cleaned. Results showed mostly minor foreign object damage on all halves.

INSPECTION PERFORMED BY: Doug Duley 9-25-01
AEP Level II MT Inspector Signature Date

11. APPROVED BY: ____________ ____________
NDE Supervisor Signature Date

MAGNETIC PARTICLE INSPECTION REPORT

APPALACHIAN POWER COMPANY
CENTRAL MACHINE SHOP
3100 MacCorkle Avenue, Bldg. 309
South Charleston, West Virginia 25303

CMS NO. ____________

DATE 9-25-01

ACCOUNT NO. ____________

1. IDENTIFICATION

Facility Mitchell

Item Throttle Valves

PC/SN Unit 1

2. TECHNIQUE - Dry Powder ☐ Wet Fluorescent ☒

Non Fluorescent ☐

3. EQUIPMENT - Coil ☒ Prods ☐ Yoke ☐ Clamps ☐

4. CURRENT TYPE - AC ☒ DC ☐

5. AMP TURNS - 4,500

6. INSPECTION PROCEDURE MI-1-5-2-3

7. INSPECTION SPECIFICATIONS MI-1-5-2-3

8 TYPE OF INDICATION FOUND
1. Crack 2. Linear Surface 3. Linear Subsurface 4. Undercut 5. Non Relevant

9. SKETCH/DESCRIPTION

A magnetic particle inspection was performed to the inside of north-south, right and left throttle valves. Results are as follows.

Left North Throttle Valve I.D. - OK
Left South Throttle Valve I.D. - 6 cracks 1/4" to 2" long on stellite seat seal weld.

Right North Throttle Valve I.D. - OK
Right South Throttle Valve I.D. - 2 cracks 1/2" & 3/4" long on stellite seat seal weld

10. INSPECTION PERFORMED BY:
AEP Level II MT Inspector
SIGNATURE Doug L Finley
DATE 9-25-01

11. APPROVED BY:
NDE Supervisor
SIGNATURE ____________
DATE ____________

CMS 97/Rev. 8-79

MAGNETIC PARTICLE INSPECTION REPORT

APPALACHIAN POWER COMPANY
CENTRAL MACHINE SHOP
3100 MacCorkle Avenue, Bldg. 309
South Charleston, West Virginia 25303

CMS NO. ____________

DATE 9-27-01

ACCOUNT NO. ____________

1. IDENTIFICATION

Facility Mitchell

Item Turbine Valve Parts

PC/SN Unit 1

2. TECHNIQUE - Dry Powder ☐ Wet Fluorescent ☒

Non Fluorescent ☐

3. EQUIPMENT - Coil ☐ Prods ☐ Yoke ☐ Clamps ☐

4. CURRENT TYPE - AC ☒ DC ☐

5. AMP TURNS - Parker Probe

6. INSPECTION PROCEDURE

MI-1-5-2-3

7. INSPECTION SPECIFICATIONS

MI-1-5-2-3

8. TYPE OF INDICATION FOUND

1. Crack 2. Linear Surface 3. Linear Subsurface 4. Undercut 5. Non Relevant

9. SKETCH/DESCRIPTION

A magnetic particle inspection was performed to the following valve parts.

Throttle Valves

4 Stems - Threads - No Cracks

4 Valve Plugs - Seats (Non Stellite) - No Cracks

4 Valve Heads - Radius At Gasket Area - Strainer To Head Welds - #1 valve has a 3½" long crack at strainer to head weld.

Governor Valves

8 Stems - Threads - No Cracks

8 Valve Plugs - Seats (Non Stellite) No Cracks

8 Valve Stands (Heads) - Radius At Gasket Area - No Cracks

Reheat Valves

Stems - Threads - No Cracks

Valve Plugs - Seats - Non Stellite - No Cracks

Reheat Stop Actuators - Bushing Seats - No Cracks

Boiler Feed Pump Turbine Valves

Control Valves - 4 Stems - Threads - No Cracks - Valve Plug Seats - (Non Stellite) No Cracks

1 INSPECTION PERFORMED BY:
AEP Level II MT Inspector

SIGNATURE Doug Dunley

DATE 9-27-01

11. APPROVED BY:
NDE Supervisor

SIGNATURE ____________

DATE ____________

CMS 97/Rev. 8-79

MAGNETIC PARTICLE INSPECTION

AMERICAN ELECTRIC POWER
CENTRAL MACHINE SHOP
3100 MacCorkle Ave. Bldg. 309
South Charleston, WV 25303

CMS- ____________

DATE 9-28-01

ACCOUNT NO. ____________

1. IDENTIFICATION

Facility - Mitchell

Item - BFP Turbine Valve Seats

PC/SN - Unit 1

2. TECHNIQUE - ☐ Dry Powder ☒ Wet Fluorescent ☐ Black Powder / Kerosene

3. EQUIPMENT MODEL: ____________

☐ Coil ☐ Prods ☐ Yoke ☐ Clamp ☐ CentralConductor

4. CURRENT TYPE - ☒ AC ☐ DC

5. AMP TURNS - Parker Probe

6. INSPECTION PROCEDURE: MI-1-S-2-3

7. INSPECTION SPECIFICATIONS: MI-1-S-2-3

8. TYPE OF INDICATION FOUND:

☐ Crack ☐ Linear Surface ☐ Linear Subsurface ☐ Undercut ☐ Other ____________

9. SKETCH/DESCRIPTION Control Valves

An inspection was performed to the seat areas of the two valves. Results showed no crack indications present.

10. INSPECTION PERFORMED BY: ____________ 9-28-01
AEP Level II MT Inspector Signature — Date

11. APPROVED BY: ____________ ____________
NDE Supervisor Signature — Date

CMS 97

LIQUID PENETRANT REPORT

APPALACHIAN POWER COMPANY
Central Machine Shop
3100 MacCorkle Avenue, Bldg. 309
South Charleston, West Virginia 25303

CMS NUMBER ____________

DATE 9-28-01

ACCOUNT NUMBER ____________

1. **IDENTIFICATION:**

Facility Mitchell

Item BFP Turbine Valve Seats

PC/SN Unit 1

2. **MATERIAL:** ☐ FERROUS ☒ NONFERROUS

3. **TECHNIQUE:** ☒ VISIBLE DYE ☐ Fluorescent

4. **BATCH NUMBER - CLEANER** PENETRANT ____________ DEVELOPER ____________

5. **INSPECTION PROCEDURE:** MI-1-5-2-2

6. **INSPECTION SPECIFICATIONS:** MI-1-5-2-2

7. **TEMPERATURE -** AMBIENT ____________ SURFACE ____________

8 **TYPE OF INDICATION FOUND:**
☐ 1. Crack ☐ 2. Linear ☐ 3. Inline Porosity ☐ 4.Rounded ☐ 5. undercut ☐ NON RELEVANT

9. **SKETCH/DESCRIPTION:**

Main Stop Valves

An inspection was performed to the seat areas of the two valves. Results showed no crack indications present.

10. **INSPECTION PERFORMED BY:** (AEP Level II PT Inspector)

nature Doug [illegible]

DATE 9-28-01

11. **APPROVED BY:** (NDE Supervisor)

Signature ____________

DATE ____________

CMS 109/Reset 8-94/dt

MAGNETIC PARTICLE INSPECTION

AMERICAN ELECTRIC POWER
CENTRAL MACHINE SHOP
3100 MacCorkle Ave. Bldg. 309
South Charleston, WV 25303

MS- ______

DATE 10-3-01

ACCOUNT NO. ______

1. IDENTIFICATION

Facility - Mitchell

Item - Boiler Feed Pump Turbine Shell

PC/SN - Unit 1

2. TECHNIQUE - ☐ Dry Powder ☒ Wet Fluorescent ☐ Black Powder / Kerosene

3. EQUIPMENT MODEL: ______

☒ Coil ☐ Prods ☐ Yoke ☐ Clamp ☐ CentralConductor

4. CURRENT TYPE - ☒ AC ☐ DC

5. AMP TURNS - 5,000

6. INSPECTION PROCEDURE: MI-1-5-2-3

7. INSPECTION SPECIFICATIONS: MI-1-5-2-3

8. TYPE OF INDICATION FOUND:

☐ Crack ☐ Linear Surface ☐ Linear Subsurface ☐ Undercut ☐ Other ______

9. SKETCH/DESCRIPTION

An inspection was performed to the upper and lower half boiler feed pump turbine shells. Results showed mostly minor foreign object damage to all 4 nozzle halves.

10. INSPECTION PERFORMED BY: ______ 10-3-01

AEP Level II MT Inspector Signature — Date

11. APPROVED BY: ______ ______

NDE Supervisor Signature — Date

MS 07

LIQUID PENETRANT INSPECTION REPORT

AMERICAN ELECTRIC POWER
CENTRAL MACHINE SHOP
3100 MacCorkle Ave. Building 309
South Charleston, WV 25303

MS NUMBER ______

CCOUNT NUMBER ______

DATE 10-3-01

1. IDENTIFICATION:

Facility Mitchell

PC/SN Boiler Feed Pump Turbine Steam Inlet Line Expansion Joint Welds

Item Unit 1

2. MATERIAL:

☐ Ferrous ☒ Nonferrous

3. TECHNIQUE:

☒ Visible Dye ☐ Fluorescent ☐ Water Washable

4. MFG/TYPE:

Cleaner ______ Penetrant ______ Developer ______

5. INSPECTION PROCEDURE: MI-1-5-2-2

6. INSPECTION SPECIFICATIONS: MI-1-5-2-2

7. TEMPERATURE:

Ambient ______ Surface ______

8. TYPE OF INDICATION:

☐ Crack ☐ Linear ☐ Inline Porosity ☐ Rounded ☐ Other ______

6. SKETCH/DESCRIPTION:

An inspection was performed to the right & left side upper and lower expansion joint welds. Results of the inspection showed no defect indications present.

INSPECTION PERFORMED BY: ______ 10-3-01
AEP Level II MT Inspector Signature Date

11. APPROVED BY: ______ ______
NDE Supervisor Signature Date

CMS 109

MAGNETIC PARTICLE INSPECTION

AMERICAN ELECTRIC POWER
CENTRAL MACHINE SHOP
3100 MacCorkle Ave. Bldg. 309
South Charleston, WV 25303

CMS - ____________________

DATE 10-4-01

ACCOUNT NO. ____________________

1. IDENTIFICATION

Facility - Mitchell

Item - HP-1st Reheat & 2nd Reheat Turbine Steam Lead Flange Bolts

PC/SN - Unit 1

2. TECHNIQUE - ☐ Dry Powder ☒ Wet Fluorescent ☐ Black Powder / Kerosene

3. EQUIPMENT MODEL: ____________________

☐ Coil ☒ Prods ☐ Yoke ☐ Clamp ☐ CentralConductor

4. CURRENT TYPE - ☒ AC ☐ DC

5. AMP TURNS - 2,500

6. INSPECTION PROCEDURE: MI-1-5-2-3

7. INSPECTION SPECIFICATIONS: MI-1-5-2-3

8. TYPE OF INDICATION FOUND:

☐ Crack ☐ Linear Surface ☐ Linear Subsurface ☐ Undercut ☐ Other ____________________

9. SKETCH/DESCRIPTION

An inspection was performed to all steam lead olts that remained. Some bolts were replaced with new ones. Results of the inspection showed no crack indications present.

10. INSPECTION PERFORMED BY: Doug Fraley 10-4-01
AEP Level II MT Inspector Signature Date

11. APPROVED BY: ____________________ ____________
NDE Supervisor Signature Date

MS 97

LIQUID PENETRANT INSPECTION REPORT

AMERICAN ELECTRIC POWER
CENTRAL MACHINE SHOP
3100 MacCorkle Ave. Building 309
South Charleston, WV 25303

S NUMBER
OUNT NUMBER

DATE 10/16/01

1. IDENTIFICATION:

Facility MITCHELL UNIT 1
PC/SN
Item GOV VALUE SEATS

2. MATERIAL:

☐ Ferrous ☑ Nonferrous

3. TECHNIQUE: ☑ Visible Dye ☐ Fluorescent ☐ Water Washable

4. MFG/TYPE: Cleaner Penetrant DoubleCHECK Developer

5. INSPECTION PROCEDURE: MI-1-5-2-2

6. INSPECTION SPECIFICATIONS: MI-1-5-2-2

7. TEMPERATURE: Ambient Surface

8. TYPE OF INDICATION:

☐ Crack ☐ Linear ☐ Inline Porosity ☐ Rounded ☐ Other

6. SKETCH/DESCRIPTION: THE FOLLOWING INSPECTIONS WERE PERFORMED ON THE RIGHT AND LEFT GOV. VALUE SEATS (4 PER SIDE)

WELD PREPS - OK
AFTER WELDING - OK
AFTER STRESS - OK
AFTER MACHINING - OK

NSPECTION PERFORMED BY: MARGOLIS 10/16/01
AEP Level II ~~[illegible]~~ PT Inspector Signature Date

11. APPROVED BY:
NDE Supervisor Signature Date

CMS 109

LIQUID PENETRANT INSPECTION REPORT

AMERICAN ELECTRIC POWER
CENTRAL MACHINE SHOP
3100 MacCorkle Ave. Building 309
South Charleston, WV 25303

'S NUMBER ____
OUNT NUMBER ____ DATE 10/16/01

1. IDENTIFICATION:
Facility MITCHELL UNIT 1
PC/SN ____
Item GOV VALUE SEATS

2. MATERIAL:
☐ Ferrous ☑ Nonferrous

3. TECHNIQUE: ☑ Visible Dye ☐ Fluorescent ☐ Water Washable

4. MFG/TYPE: Cleaner ____ Penetrant DoobleCHECK Developer ____

5. INSPECTION PROCEDURE: MI-1-5-2-2

6. INSPECTION SPECIFICATIONS: MI-1-5-2-2

7. TEMPERATURE: Ambient ____ Surface ____

8. TYPE OF INDICATION:
☐ Crack ☐ Linear ☐ Inline Porosity ☐ Rounded ☐ Other ____

6. SKETCH/DESCRIPTION: THE FOLLOWING INSPECTIONS WERE PERFORMED ON THE RIGHT AND LEFT GOV. VALUE SEATS (4 PER SIDE)

WELD PREPS - OK
AFTER WELDING - OK
AFTER STRESS - OK
AFTER MACHINING - OK

NSPECTION PERFORMED BY: MARGOLIS 10/16/01
AEP Level II PT Inspector Signature Date

11. APPROVED BY: ____ ____
NDE Supervisor Signature Date

CMS 109

LIQUID PENETRANT INSPECTION REPORT

AMERICAN ELECTRIC POWER
CENTRAL MACHINE SHOP
3100 MacCorkle Ave. Building 309
South Charleston, WV 25303

'S NUMBER

COUNT NUMBER

DATE 10/16/01

1. IDENTIFICATION:
Facility MITCHELL UNIT 1
PC/SN
Item GOV VALVE SEATS

2. MATERIAL: ☐ Ferrous ☑ Nonferrous

3. TECHNIQUE: ☑ Visible Dye ☐ Fluorescent ☐ Water Washable

4. MFG/TYPE: Cleaner Penetrant DoubleCHECK Developer

5. INSPECTION PROCEDURE: MI-1-5-2-2

6. INSPECTION SPECIFICATIONS: MI-1-5-2-2

7. TEMPERATURE: Ambient Surface

8. TYPE OF INDICATION:
☐ Crack ☐ Linear ☐ Inline Porosity ☐ Rounded ☐ Other

6. SKETCH/DESCRIPTION: THE FOLLOWING INSPECTIONS WERE PERFORMED ON THE RIGHT AND LEFT GOV. VALVE SEATS (4 PER SIDE)

WELD PREPS - OK
AFTER WELDING - OK
AFTER STRESS - OK
AFTER MACHINING - OK

'NSPECTION PERFORMED BY: MARGOLIS 10/16/01
AEP Level II PT Inspector Signature Date

11. APPROVED BY:
NDE Supervisor Signature Date

CMS 109

MAGNETIC PARTICLE INSPECTION

AMERICAN ELECTRIC POWER
CENTRAL MACHINE SHOP
3100 MacCorkle Ave. Bldg. 309
South Charleston, WV 25303

CMS- ______________

DATE 10-24-01

ACCOUNT NO. ______________

1. IDENTIFICATION

Facility - Mitchell

Item - H.P.-1st Reheat Outer Shell Inner Shell Drain Line Welds

PC/SN - Unit 1

2. TECHNIQUE - ☐ Dry Powder ☒ Wet Fluorescent ☐ Black Powder / Kerosene

3. EQUIPMENT MODEL: ______________

☐ Coil ☐ Prods ☐ Yoke ☐ Clamp ☐ CentralConductor

4. CURRENT TYPE - ☒ AC ☐ DC

5. AMP TURNS - Parker Probe

6. INSPECTION PROCEDURE: MI-1-5-2-3

7. INSPECTION SPECIFICATIONS: MI-1-5-2-3

8. TYPE OF INDICATION FOUND:

☐ Crack ☐ Linear Surface ☐ Linear Subsurface ☐ Undercut ☐ Other ______________

9. SKETCH/DESCRIPTION

A wet magnetic particle inspection was performed to the following welds on the bottom of the outer shell.

Governor End Inner Shell Drain Line

1 Drain Line Weld To Socket At Shell - OK
2 Drain Line Weld To Next Socket Down (Bottom Weld Only) - OK
3 Drain Line Weld To Next Socket Down (Top Weld Only) - OK

Generator End Inner Shell Drain Line

1 Drain Line Weld To Socket At Shell - OK
2 Drain Line Weld To Next Socket Down (Bottom Weld Only) - OK
3 Drain Line Weld To Next Socket Down (Top Weld Only) - OK

10. INSPECTION PERFORMED BY: Doug Fraley — 10-24-01

AEP Level II MT Inspector Signature — Date

11. APPROVED BY: ______________ ______________

NDE Supervisor Signature — Date

CMS 97

ALLOY ANALYZER INSPECTION REPORT

AEP - CMS
3100 MacCorkle Ave. Building 309
South Charleston, WV 25303

'S NO:
T NO:
FACILITY: Mitchell
ITEM: 1st & 2nd Reheat Steam Inlet Lines
PC/SN: Unit 1

Al - Aluminum	Mn - Manganese
C - Carbon	Mo - Molybdenum
Co - Cobalt	Nb - Niobium
Cr - Chromium	Ni - Nickel
Cu - Copper	Pb - Lead
Fe - Iron	Sn - Tin
Ti - Titanium	
V - Vanadium	
W - Tungsten	
Zn - Zinc	

DESCRIPTION	C	Co	Cr	Cu	Fe	Mn	Mo	Nb	Ni	Ti	W		
See Attached Sheets													

Analysis Performed By: Doug

Date: 9-25-01

NDE Supv:

Date:

Mitchell Unit 1 - 1st & 2nd Reheat Upper & Lower Steam Inlet Lines

1st Reheat - Left Side Upper

Reading #

1 - P22 - Near Flange At Top of Shell
2 - P22
3 - P22
4 - P22
5 - P22
6 - P22
7 - P22
8 - P22
9 - P22
10 - P22 - At "Y" Split Below 1st Reheat Valve

1st Reheat - Left Side Lower

Reading #

1 - P22 - Starting At "Y" Split Below 1st Reheat Valve
2 - P22
3 - P22
4 - P22
5 - P22
6 - P22
7 - P22 - Long Straight Run Up To Bottom of 1st Reheat Shell

CRMO-P22

CR-	Chrome	2.00	to	2.50
MO-	Molybdenum	0.90	to	1.10
FE-	Iron	95.75	to	96.80
MN-	Manganese	0.30	to	0.60

st Reheat - Right Side Upper

Reading #

1 - P22 - Near Flange At Top of Shell
2 - P22
3 - P22
4 - P22
5 - P22
6 - P22
7 - P22
8 - P22
9 - P22
10 - P22
11 - P22 - At "Y" Split Below 1st Reheat Valve

1st Reheat - Right Side Lower

Reading #

1 - P22 - Starting At "Y" Split Below 1st Reheat Valve
2 - P22
3 - P22
4 - P22
5 - P22
6 - P22
7 - P22 - Long Straight Run Up To Bottom of 1st Reheat Shell

2nd Reheat - Left Side Upper
Reading #
1 - P22 - Elbow Going Into Top of Shell
2 - P22 - Elbow Behind Flange
3 - P22
4 - P22
5 - P22 - Going Into Bottom of South 2nd Reheat Valve

2nd Reheat - Left Side Lower
Reading #
1 - P22 - Coming Out of Bottom of North 2nd Reheat Valve
2 - P22
3 - P22
4 - P22
5 - P22
6 - P22 - Straight Run Upto Bottom of 2nd Reheat Shell

2nd Reheat - Right Side Upper
Reading #
1 - P22 - Elbow Going Into Top of Shell
2 - P22 - Elbow Behind Flange
3 - P22
4 - P22
5 - P22 - Going Into Bottom of South 2nd Reheat Valve

2nd Reheat - Right Side Lower
Reading #
1 - P22 - Coming Out of Bottom of North 2nd Reheat Valve
2 - P22
3 - P22
4 - P22
5 - P22
6 - P22 - Straigh Run Upto Bottom of 2nd Reheat Shell

WESDYNE
INTERNATIONAL

MAGNETIC PARTICLE EXAMINATION

FORM NUMBER PGBU 1157B

COPY JOBSITE AEP ATTN J. Huggins
COPY QUALITY ASSURANCE ATTN R. Rischel
COPY DISTRICT OFFICE ATTN
COPY NDE PRODUCT LINE ATTN M. Salsano
COPY ATTN

JOB NO.
DATE JOB COMPLETED 22 Sep. 01
CUSTOMER AEP Mitchell #4
LOCATION Moundsville, WV
SUPERVISION
TITLE / DATE

PROCESS SPECIFICATION/FIP

APPARATUS IDENTIFICATION

SN 13A3160-1 TEST NO N/A
BB 46 DRAWING N/A

VISUAL TEST (VT)

VISUAL AID Flashlight and Mirror
SURFACE FINISH Abrasive Blasted

MAGNETIC PARTICLE TESTING (MT)

MACHINE: UNIT MP-2000C SN 2000474 CAL. ON 10/11/00 CAL. DUE 10/11/01
YOKE: TYPE N/A SN N/A CAL. ON N/A CAL. DUE N/A PROD OR POLE SPACING N/A
PARTICLES: WET ☒ DRY ☐ TYPE MRIC CONCENTRATION (mL/mL)
CURRENT: TYPE AC AMPS 1250 TURNS 4
MAGNETIC FIELD: VERIFIED USING Cracked Washer SN N/A
RESIDUAL MAGNETIC FIELD: LEVEL REMAINING N/A DETERMINED USING N/A SN N/A

BLACK/WHITE LIGHT

MANUFACTURER/MODEL NO. N/A CAL. ON N/A CAL. DUE N/A
BLACK LIGHT INTENSITY N/A WHITE LIGHT INTENSITY N/A

ITEMS EXAMINED	IDENTIFY INDICATIONS
MT - Exam of VHP Inlet Sleeve	
(Trepan Areas)	
Cover: C-1, C-2, C-3 and C-4	No indications - acceptable
Base: B-1, B-2, B-3 and B-4	No indications - acceptable

Barry L. Hegley LII
NDE TECHNICIAN SIGNATURE

22 Sep. 01
DATE

Page 1 of 1

CONSOLIDATED FABRICATORS, INC. CFI

A Global Power Equipment Group Company

CERTIFICATE OF CONFORMANCE AND TEST

P.O.#: 4500358484 DWG.#: 2325J40G01 REV.: 01
LINE ITEM: 00001 DESC.: Collector Housing Outline
*SUBCONTRACTOR SUPPLIED X yes no by: Diversified Machine
WELD PROCEDURES & REV: CFI's GMAW-012, FCAW-001B, FCAW-001-A-2G, FCAW-035-A/B-3G. Welding is in accordance with SWPC's 82148PB and 82148PC.

TESTING: MPI XX ULTRASONIC____ LIQ.PEN.____ HYDRO____ VISUAL XXX
RADIOGRAPHY____ GRAVITY____ AIR____ OTHER____
NDT PROCEDURE: SWPC's 84353MA and 84350KC REV: 05 & 02
PERFORMED BY: Ron Ferguson LEVEL II DATE: 9/25/01
EXTENT OF TEST: 100% visual all welds. Mag particle of lifting lugs.
NDT TEST RESULTS: ACCEPT XXXX REJECT____

STRESS RELIEF: YES___ NO X TEMP:____ HOLD TIME:____
DATE:____ SPEC:____ REV:____

DIMENSIONAL AND PARTS VERIFICATION PER DRAWING: YES X NO____

VENDOR REQUEST FOR DEVIATION: YES_ NO X IF YES, CUST.#:____

SUPPLEMENTAL INFORMATION:____
SO 0425

THIS IS TO CERTIFY THAT THE PART/UNIT SUPPLIED UNDER THE REFERENCED PURCHASE ORDER AND AS FULLY DESCRIBED HEREIN HAS BEEN MANUFACTURED, INSPECTED, AND TESTED IN FULL CONFORMANCE TO CONTRACT REQUIREMENTS, AND THAT DOCUMENTATION SUPPORTING SUCH CONFORMANCE IS AVAILABLE AND WILL BE KEPT ON FILE BY THIS COMPANY FOR A MINIMUM OF 7 YEARS.

TO THE BEST OF OUR KNOWLEDGE, NO MERCURY OR MERCURY COMPOUNDS WERE USED IN THE MANUFACTURE OF THIS PRODUCT.

AUTHORIZED COMPANY REPRESENTATIVE: Ronald S. Ferguson

DATE: 10/05/01

CONSOLIDATED FABRICATORS, INC.
CFI SINCE 1971
A Global Power Equipment Group Company

SHIP TO: OHIO POWER COMPANY
MITCHELL PLANT
12 MILES SOUTH MOUNDSVILLE
WVA-RT2
CRESAP, WV 26041

COLLECTOR HOUSE PACKING LIST
PO# 4500358484
REFERENCE DRAWING: 2325J40G1 REV 1

PAGE 1 OF 1 SO# 0425 DATE: 10-05-01

LINE #	MARK#	DESCRIPTION	QTY	COMMENTS
1	2325J40G1	COLLECTOR HOUSE ASSEMBLY	1	
2	CH2	INLET HOOD "KEES" W/FILTERS	1	
3	CH106	EXHAUST DUCT	1	
4	CH107	INLET DUCT	1	
5	CH308	END WALL COVERS	2	
6	CH309	END WALL COVERS	2	
7	363	GASKET - 1/4" THK X 2" EPDM SC41 W/PSA	45'	
8	1001	GASKET - NEOPRENE 3/8" THK X 2" ASTMD-1056 SC41 W/PSA	50'	
9	443	BOLT - HEX ½" - 13 X 1 ½" LG GR8 ZP	35	
10	347	WASHER - ½" NOM ID NEO BACKED	35	
11	303	BOLT - HEX 1/4" - 20 X 1 1/2" GR8 ZP	20	
12	305	NUT - HEX 1/4" - 20 GR8 ZP	20	
13	306	WASHER FLAT 1/4" NOM ID NEO BACKED	40	

Prepared By: MJ	Date 10/12/98	QUALITY CHECK SHEET FOR COLLECTOR HOUSING	Proc. # WI-10
			Rev. # 01
Approved By:	Date: 10-14-98		Page 1 of 1

DWG # 2287J59G1

CFI S/O # 0425

Q.A. APPROVED PB 10.5.01

PA # 4500358484

DATE: 10.5.01

INSPECTOR: Perry Blakley

THIS CHECK SHEET MUST BE COMPLETED AND PRESENTED TO THE SOURCE INSPECTOR AT FINAL SOURCE INSPECTION.

	ACC	REJ
1. OVERALL DIMENSION: A. HEIGHT 80.56 B WIDTH 163.63 C. LENGTH 101.63	✓	
2. LOCATION OF PENETRATIONS	✓	
3. VERIFICATION OF PANELS FOR FLATNESS PER WI-09	✓	
4. VERIFICATION OF DOOR GASKET SEALS	✓	
5. VERIFICATION OF ALL GASKETS SET PER DRAWING REQUIREMENTS, OTHER THAN BOTTOM GASKET	✓	
6. VERIFICATION OF FLATNESS OF COLLECTOR HOUSING PER WI-09	✓	
7. PAINT PER PURCHASE ORDER REQUIREMENTS OR DRAWING REQUIREMENTS	✓	
8. VERIFICATION OF SELF-TAPPING SCREWS TO BE TIGHT; LOCKTITE-271 SCREWS TO SECURE	✓	
9. VERIFICATION OF BOLTS AND LOCKNUTS USED WERE REQUIRED BY WI-09	✓	
10. VERIFICATION OF ALL ELECTRICAL LINES RUN IN CONDUIT TO DRAWING REQUIREMENTS	✓	
11. VERIFICATION OF P.O. REQUIREMENTS FOR COUPLING SEAL [✓ REQUIRED] NOT REQUIRED	✓	
12. VERIFICATION OF FILTERS. FILTERS ARE TO SLIDE EASILY ALONG FILTER FRAMES	✓	