50-422-000
Pf 21 82175
Publicly Available

LOUIS ALLIS
Litton Beloit Power Systems

555 Lawton Avenue, Beloit, WI 53511 608/365-4491 TLX260029

DESIGNATED ORIGINAL

Certified By R Stasny 5/17/82

423
443
444
334
412
395
397
460
513
508
509
546
547

U. S. Nuclear Regulatory Commission
799 Roosevelt Road
Glen Ellyn, IL 60137

April 23, 1982

Attention: Mr. Nick Jackiw R-3 50-42697

Subject: Reference Telcon on 4/21/82 at 4:26 p.m.
Between Nick Jackiw of NRC and Rick Haisler,
Manager, Quality Assurance of BPS

Gentlemen:

In response to the subject telcon the following background information is submitted.

On 4/20/82 Beloit Power Systems received a communication from Colt Industries expressing concern over the BPS procedure for torquing the stud/nut combination holding the BPS generator spider to the Colt generator shaft on BPS generator S/N 700510R2. This communication is submitted as Attachment (1).

The application of this stud/nut design is shown on Colt Industries Drawing Number 11871439 Attachment (2) submitted for your information.

The 700512R2 stud/nut assembly was torqued on 10/19/81 to the limits as specified by the Colt Industries Dwg. #11871439 and witnessed by personnel from Bechtel, Colt Industries and BPS. Results are tabulated on Attachment (3).

The equipment used to complete this process was calibrated and maintained in accordance with BPS Q.A. procedures. The calibration certification is included as Attachment (4) Sheets 1 and 2.

In a follow up meeting with Colt personnel on 4/21/82 BPS was presented with the backup data which generated the 4/20/82 communication. This data is forwarded as Attachment (5) for your information.

Based on a review of the backup data, LA/BPS took the following action:

1. Informed the NRC by the subject telephone message.

2. Notified (by mailgram) the end users of nuclear generators of this design to take preventive action. Mailgram is Attachment (6). (4/22-23/82)

3. List of end users and generator serial numbers are attached for reference, Attachment (7).

4. A series of tests have been arranged to determine if a problem exists. These tests are outlined in Attachment (8).

IE19

APR 26 1982

IE 19

Results of these tests will be submitted upon completion.

If there are any further questions, please contact the writer.

Sincerely,

Richard K. Haisler
Manager, Quality Assurance

RKH/bkw

Attachments

Attachment 1

Colt Industries

Fairbanks Morse
Engine Division
701 Lawton Avenue
Beloit, Wisconsin 53511
608/364-4411

April 20, 1982

DESIGNATED ORIGINAL

Certified By R Massey 5/17/82

Beloit Power Systems
555 Lawton Avenue
Beloit, WI 53511

Attention: Shef Massey

Subject: BPS Generators Provided for Nuclear Standby Service - Alternator to Spider Rotor Torque Value Discrepancies, Hope Creek Alternator S/N 700510R2

Reference:
(a) Code of Federal Regulations - Title 10, Part 21 - REPORTING OF DEFECTS AND NON-COMPLIANCE.
(b) BPS Hope Creek Generator Record - Table 1, Torque Sequence Page 2 of 2 (Undated Signed by Colt/BPS/Bechtel Q/A on 10/19 & 20/82)

Gentlemen:

Colt performed a recheck of generator rotor to spider fastener torque values on March 12, 1982 to verify operation of newly designed tooling for use in the field. During this check, it was revealed that fastener #3 was not loaded at all while three other fasteners were only about 13% tight based on prescribed torque values. This revelation is not consistent with documentation presented to Colt, reference (b).

Colt is critically concerned about application of tooling used by BPS to physically torque the fasteners and determine torque values recorded on reference (b). Further, we feel that other BPS generators already shipped to the field could have latent defects with respect to improperly torqued rotor to spider fasteners. Defects of this nature must be reported under reference (a) regulations.

Colt requests you give this problem your immediate consideration and advise your intended corrective action within twenty-four hours. Such corrective action must include reporting of this defect to the NRC as required by reference (a). If you do not respond accordingly, Colt will be obligated to issue a report to the NRC naming your generators as potentially defective under the requirements of reference (a).

Very truly yours,

COLT INDUSTRIES OPERATING CORP
FAIRBANKS MORSE ENGINE DIVISION

G. E. Lanzendorfer
Manager, Contract Administration

GEL/jeh

Attachment 2

1871439

TORQUING PROCEDURE

② 1. COAT ALL THREADS & NUT SEALING AREAS WITH A SUITABLE ANTI-SEIZE COMPOUND (MOLY-COAT OR EQUIVALENT).

② 2. INSTALL STUDS & NUT SUCH THAT THE STUDS PROTRUDE PAST THE NUTS APPROX. EQUALLY ON EACH END.

② 3. NUMBER & MARK THE STUDS, NUTS & ADJACENT TO THE NUTS ON THE DRIVE END SHAFT FLANGE, CONSECUTIVELY FROM (1) TO (14) FOR ORDER OF TORQUING & RECORDING PURPOSES.

④ 4. TIGHTEN STUDS EQUALLY TO 400 FT./LBS. TORQUE. INSURE ROTOR FLANGE IS FULLY SEATED TO SHAFT FLANGE.

⑤ 5. TORQUE STUD NUTS UP TO 1500-2000 FT/LBS. IN THE ORDER LISTED IN TABLE I, SIGN OFF STEP.

⑥ 6. TORQUE STUD NUTS UP TO 2500-3000 FT./LBS. IN THE SAME ORDER. SIGN OFF STEP.

⑦ 7. FINISH TORQUING STUD NUTS TO 3500 FT./LBS. (MIN.) TO 4500 FT./LBS. (MAX.) IN THE SAME ORDER.

⑧ 8. RECORD THE FINAL TORQUE VALUES ON TABLE II. SIGN OFF RECORD.

③

-TABLE I-

ORDER OF TIGHTENING STUDS IN STEPS 5 & 6:

— TABLE II — ④

STUD/NUT NO.	FINAL TORQUE	CONTRACT FM50#
1		
2		
3		SIGN OFF:
4		STEP 5 -
5		STEP 6 -
6		FINAL (7) -
7		
8		INSPECTION -
9		
10		CUSTOMER / COLT Q.A.:
11		
12		
13		DATE COMPLETED:
14		

TABLE II
1 THRU 5
NO'S. TO STUDS & NUT

DESCRIPTION | CHK'D. BY

TITLE
ASSY'- ALT. ROTOR HUB TO EXT. SHAFT PC-2V

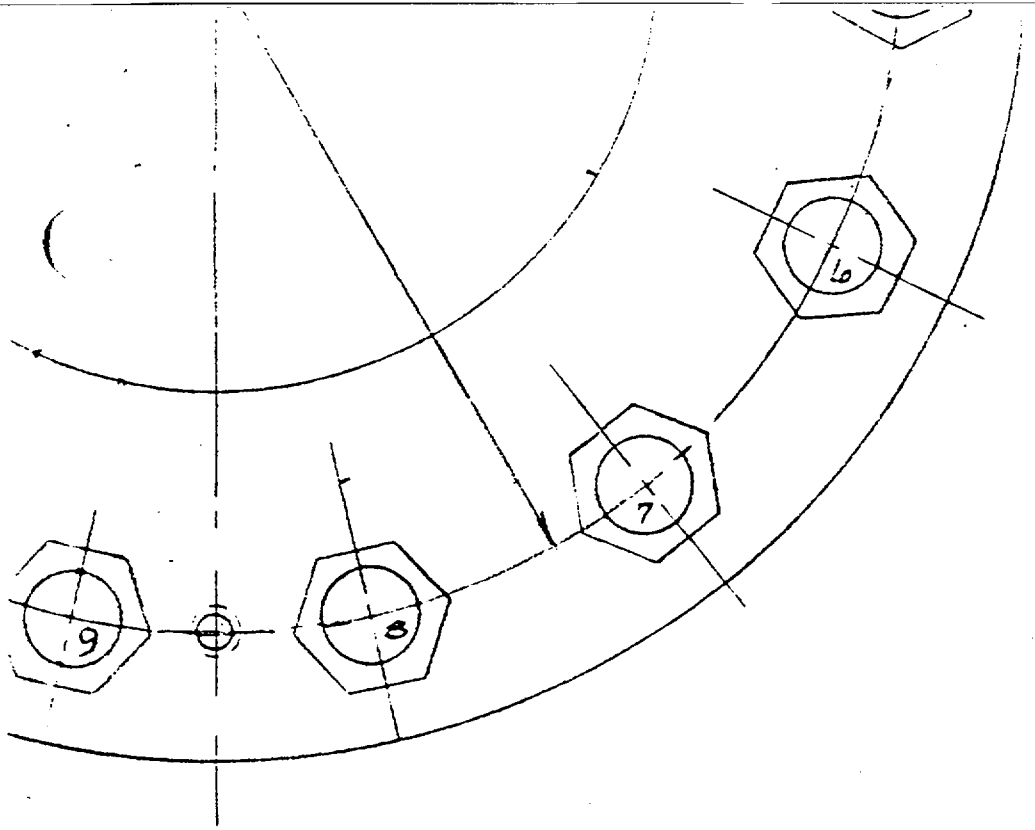
TOLERANCES
(Unless Otherwise Specified)
FRACTIONAL MACHINING ± 1/64
TOOL DESIGN ± .002
FLAME CUTTING, SHEARING, NIBBLING, FORMING AND WELDING ± .060
DECIMAL MACHINING TOLERANCES
0.- ± .060 0.0- ± .030 0.00- ± .010

Colt Industries — Fairbanks Morse Power Systems Division

REL. NO. P6812	2/18/77	ASSY. OR LO.	
DR. BY P. LANSING	2/4/77	SCALE 1/4 = 1	
CHK'D. BY JGC	2/8/77	HEAT TR.	
MAT'L			
APPV. CAST.		MAT'L	
APPV. MACH.		ENGR. R.J.M.	
APPV. WELD.			

SHEET SIZE D | DWG. NO. 187439 | SHEET 1 OF 1

12 | 13 | 14 | 15

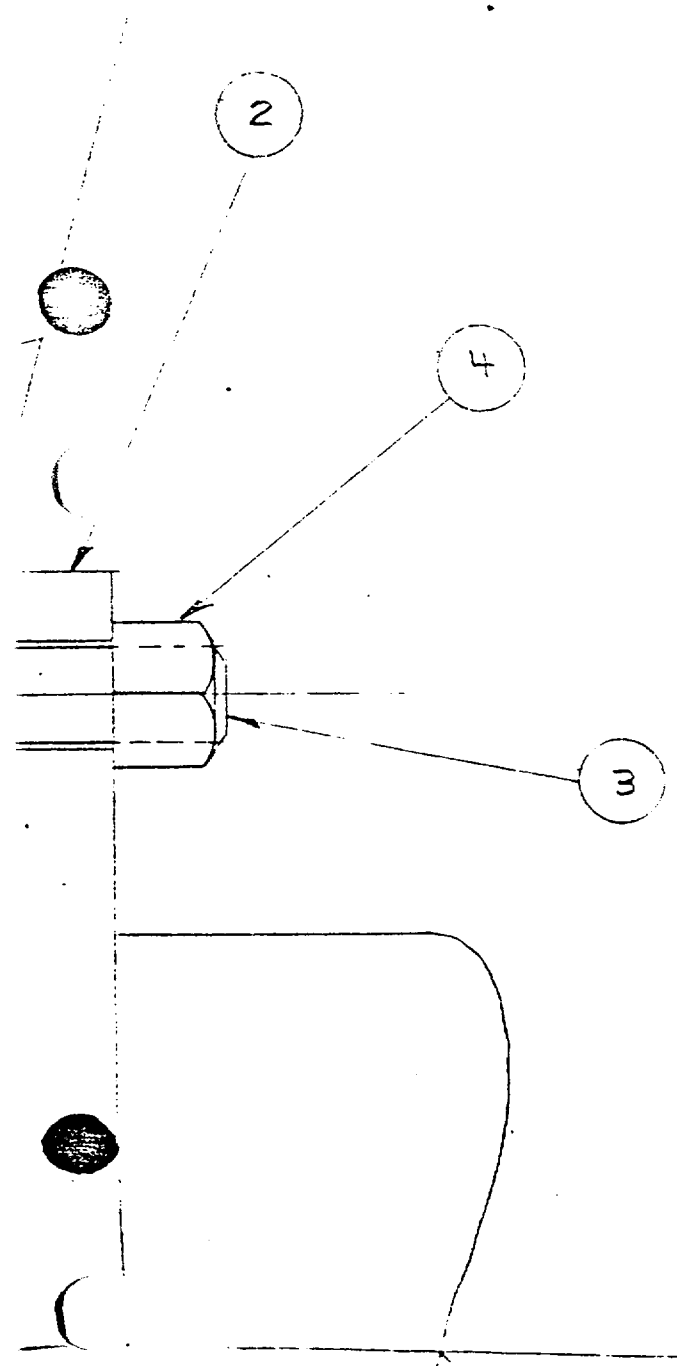


REV. NO.	CHANGE ORDER NO.	DATE
1	P11525	10-1-[illegible] 8[illegible]
1	" "	

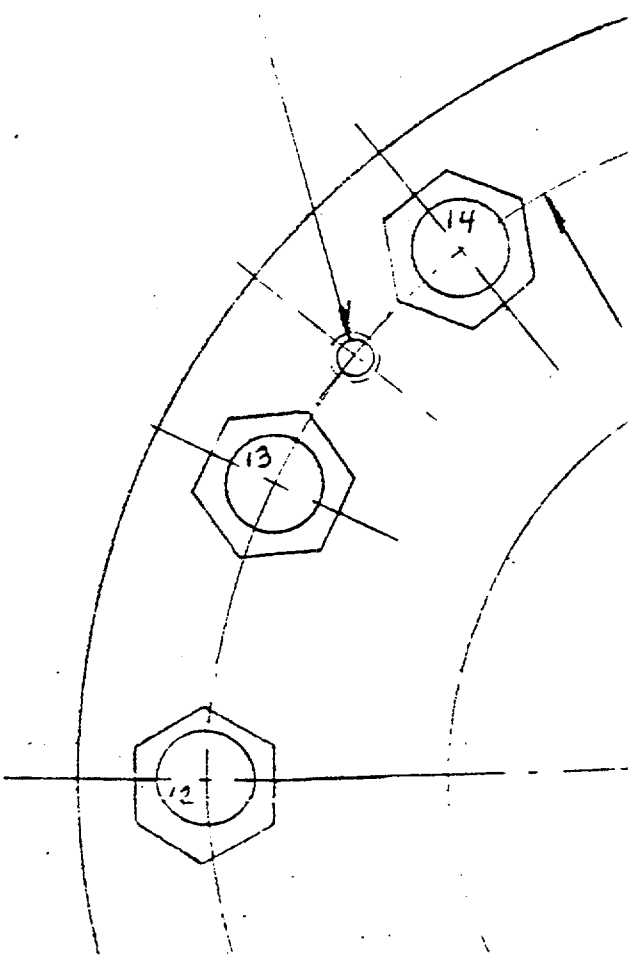
5.00 B.C.
1
2
3
4

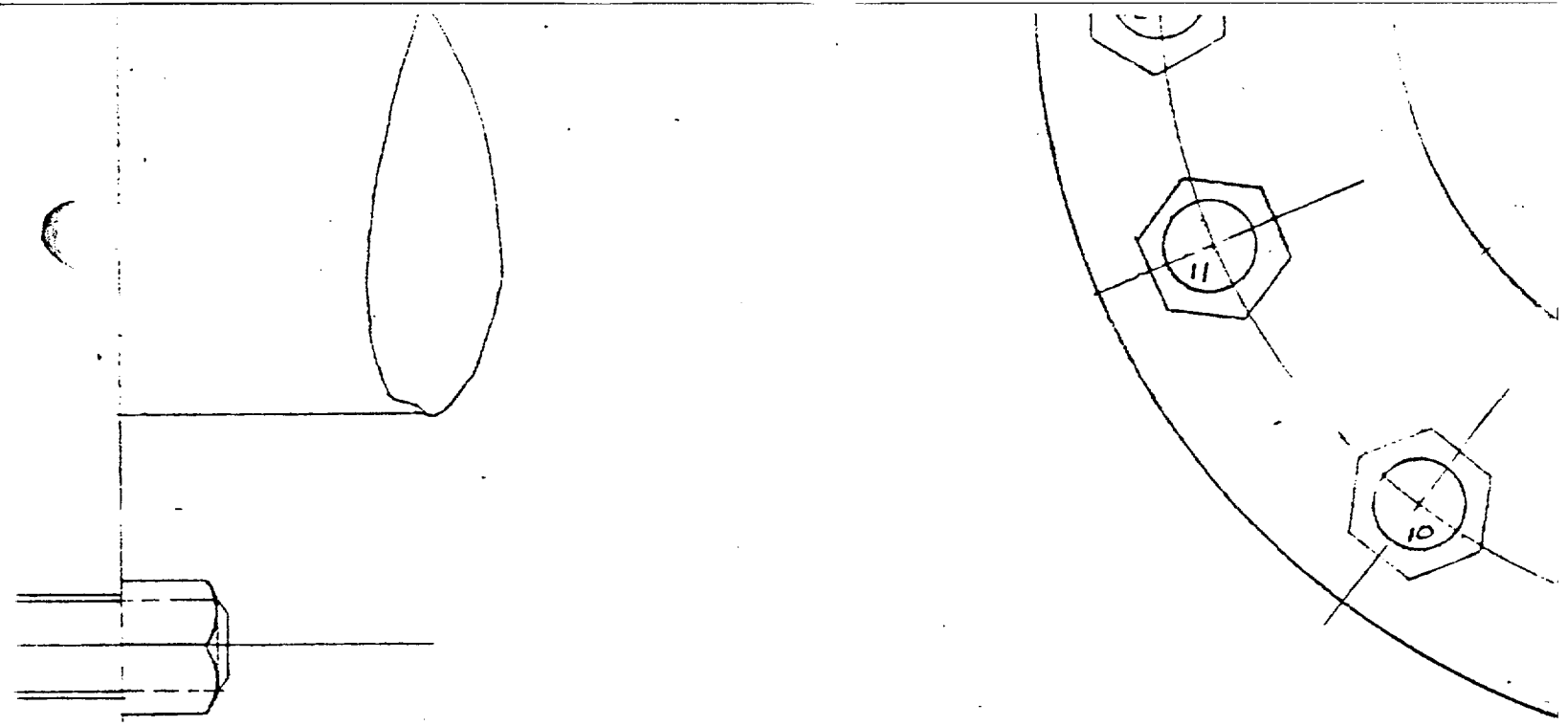
ERNATOR
OR HUB

SHAFT FLANGE

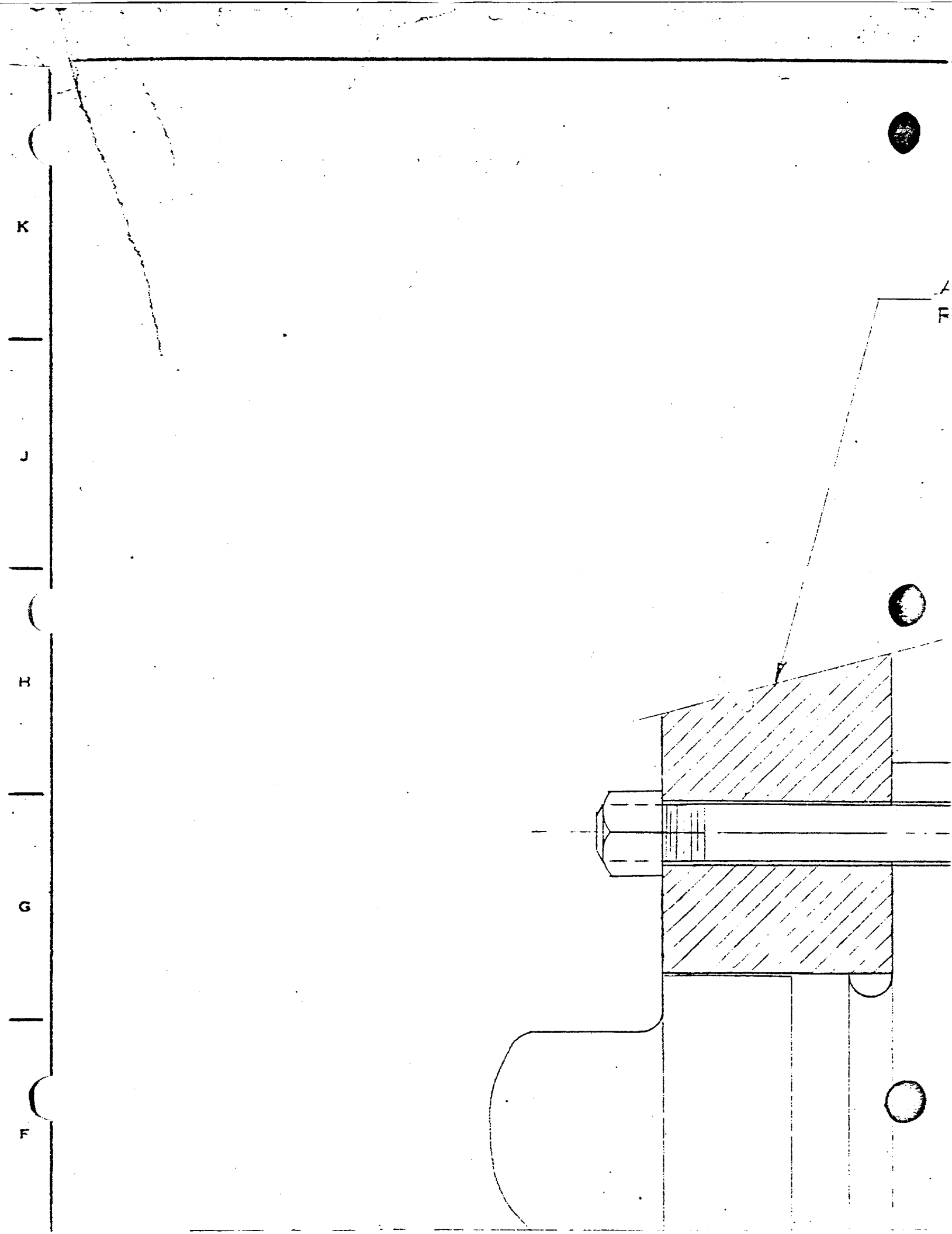


1 FOR ROTOR REMOVAL ONLY





EF →


K
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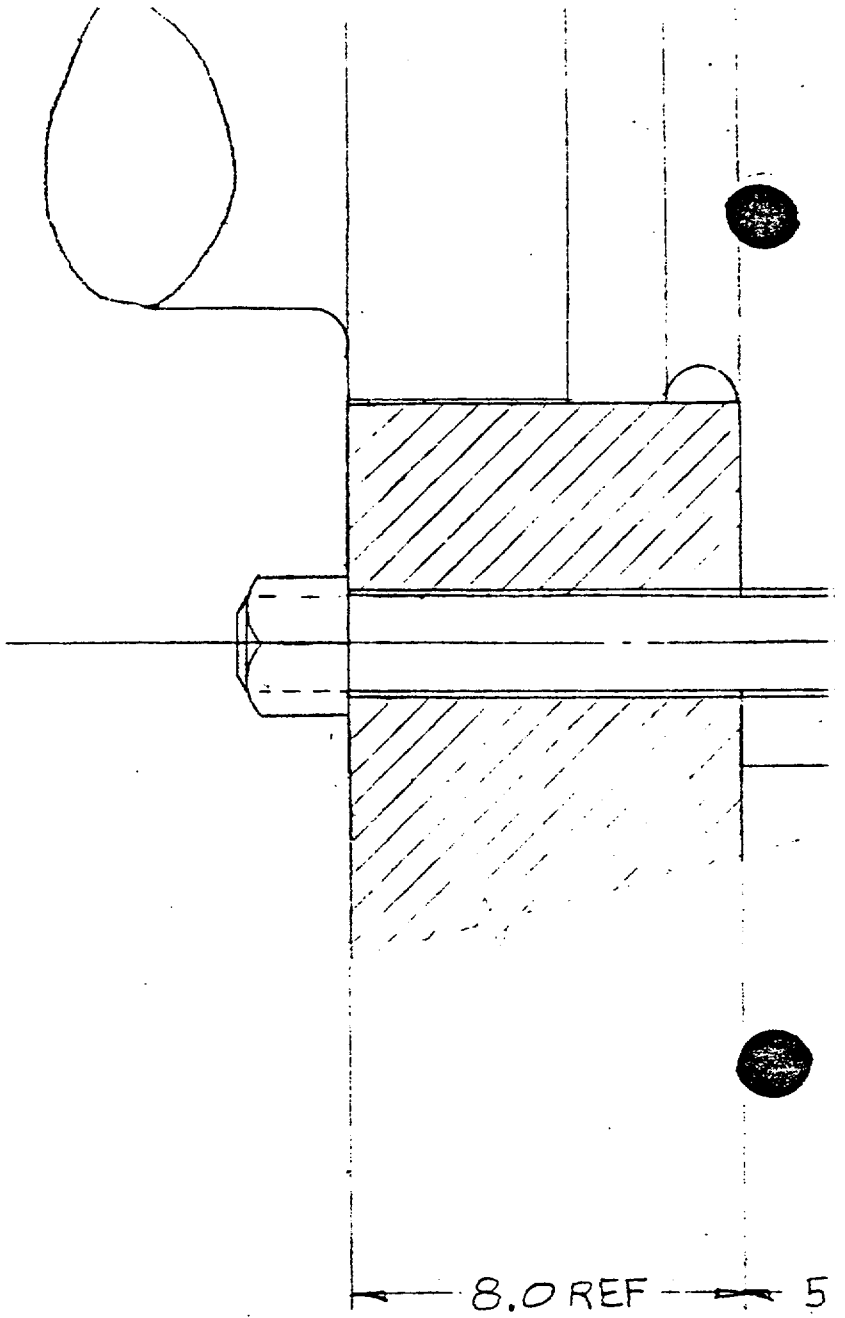
F


8.0 REF
5

Attachment 3

LOUIS ALLIS
Beloit Power Systems
555 Lawton Avenue, Beloit, WI 53511 608/365-4491 TLX 257344

Quality Verification Data For S/N 700510-R2

TABLE I - TORQUING SEQUENCE

Order of tightening studs in steps 5, 6 & 7:

1, 6, 11, 2, 7, 12, 3, 8, 13, 4, 9, 14, 5, 10, (1)

TABLE II

Stud/Nut No.	Final Torque	WITNESSED ~~Approved~~ By: BPS	Colt	Bechtel	
1	312 \ 4323	Y. Hamil 10-19-81	507	BECHTEL 508	Step 5
2	310 \ 4295	Samp	P L Burnow		
3	310 \ 4295	Y. HAMIL Samp 10-19-81	507	BECHTEL 508	Step 6
4	310 \ 4295	M. Ross 10-19-81	P L Burnow		
5	310 \ 4295	M. Ross 10-19-81		BECHTEL 508	Final (7)
6	310 \ 4295		P L Burnow		
7	312 \ 4323				
8	310 \ 4295				
9	310 \ 4295				
10	310 \ 4295				
11	310 \ 4295				
12	312 \ 4323				
13	312 \ 4323				
14	312 \ 4323				
1	312 \ 4323				

Value recorded and calculated by Samp, QAE, 10-19-81

Torque = 17.32 X Input Value X .80

Limits: 305 minimum; 310 maximum

Torque Wrench # LAB-Z-0211

Calibrated on 3-13-81 by Colt Ind. / FMED

Due on 3-82

Q.A. Reviewed and Approved:

Richard K Haisler Mgr QA — 10-19-81

Beloit Power Systems — Date

M. J. Andrus Q.A.E. — 10/20/81

Colt Industries — Date

Lawrence W. Palmer — 10/19/81

Bechtel SQR, Witness Only — Date

See NCR# A-2357; Ref. Torque limit.

LOUIS ALLIS

CALIBRATION RECORD

Attachment 4 - Sheet 1

Description	Mfg. Serial #	Identification #
Torque Wrench	N/A	LAB-Z-0211
Manufacturer	Model #	
Snap On	602-A-14B	Old ID #BPS-771
Shop Location	Size	
Snap On	0-600 Lbs.	
Method of Calib.	Calib. Lab Name	60
	BPS	

NoGo Certs Reqd: Yes No

%	Std Used	Rdg.	Req'd Adj.	Calibration Date	By	Due
0		R-0 L-0	NONE			
25	150	R-155 L-150	NONE			
50	300	R-310 L-310	NONE			
75	450	R-450 L-460	NONE			
100	575	R-580 L-570	NONE	CAL 3-13-81 EMM		3-82
0						
25						
50						
75						
100						
0						
25						
50						
75						
100						
0						
25						
50						
75						

%	Std Used	Rdg.	Req'd Adj.	Calibration Date	By	Due
0				CALIBRATED BY		
25				SNAP-ON-TOOL		
50				KENOSHA, WI.		
75						
100						
0						
25						
50						
75						
100						
0						
25						
50						
75						

LAB-2-0211

Snap-on Tools

Calibration Certificate

MODEL TE602 SERIAL 5887 SERVICE ORDER NO. 3359MI

TYPE II CLASS I STYLE A

As referenced in Federal Specification G.G.G.-W-686.

MASTER TESTER READINGS CLOCKWISE UNITS		TORQUE WRENCH TEST POINTS UNITS FT. LBS.	MASTER TESTER READINGS COUNTER CLOCKWISE UNITS	
AS RECEIVED	AFTER CALIBRATION		AS RECEIVED	AFTER CALIBRATION
120	121	120	123	121
240	237	240	246	240
361	355	360	370	360
482	475	480	496	478
602	596	600	621	596

We certify that Master Tester Model TT2000 Serial 1005 is accurate within 1/10 of one percent and that it meets the tolerances established by the National Bureau of Standards Handbook 44 throughout the entire scale range. Accuracy of the above Master Tester is verified at 180 day intervals by a qualified outside source. Notification of test date appears on the Master Tester as referenced in MIL-C-45662A, Para. 3.2.7. Accuracy of the Master Tester is verified with weights as referenced in the National Bureau of Standards Handbook 105-1. We certify that the above Master Tester is calibrated and used in an environment necessary to assure continued accuracy giving due consideration to temperature, humidity, vibration and cleanliness as referenced in MIL-C-45662A and MIL. Handbook 52.

TEST PERFORMED AT:
SNAP-ON TOOLS CORPORATION
MIDWEST SERVICE CENTER
6527-28th AVE.
KENOSHA, WIS. 53140

TESTED BY: Connie Poole

DATE 1-4-82 19___

NOTARIZATION IF REQUESTED

SUBSCRIBED AND SWORN TO BEFORE ME THIS ___ DAY OF ___ 19___

MY COMMISSION EXPIRES ___

2% ACCURACY

SC-23D

Attachment 5

RECEIVED E. A. USTRUCK

MAR 22 1982

PIELSTICK ENGRG.

W. B. Munns

R. J. Maddock

7000D2 12 PC2 Hope Creek
BPS Alt S/N 7005102

March 18, 1982

As you requested I have reviewed the data generated by your recent tests of the alternator mounting bolts on this unit.

The bolts had presumably been tightened to 4000 ft.lbs. torque by BPS. Application on an accurately applied 5000 ft.lb. load then produced the following additional net nut run-up. Also shown is the estimated additional load generated by considering 90% of the run-up to be actual bolt elongation, and the original bolt load as a percent of the final load.

Bolt No.	Nut Run-Up in Flats	Change In Bolt Load lbs	Est. Original Tightness % of Final
1	1/4	54675	71
6	---	---	--
11	0	0	100
2	3/4	164025	13
7	5/8	136688	27
12	3/8	82013	56
3	1	218700	0
8	1/2	109350	42
13	1/4	54675	71
4	3/4	164025	13
9	1/8	27338	85
14	3/4	164025	13
5	5/8	135688	27
10	5/8	136688	27
	Average	111453	42%

Average increases in root stress 44591 psi
Est. average load at 5000 ft.lbs. torque 187500 lbs.
Est. average stress at 5000 ft.lbs. torque 75017 psi
Original as % of drawing 11 871 439 spec. 53%

While estimating bolt load from the applied torque does not yield good accuracy, it is clear that the average load was not what it should have been. Even more disturbing is the one bolt that was not loaded at all and the three that were only about 13% tight. These 4 were certainly potential candidates for further loosening under operating vibration and load cycling.

The specification per 11 871 439 should have tightened all bolts to 4000 ft.lbs. Had this been true the average additional nut run-up would have been about 3/16 of one flat, only two moved this little.

RJM/ms

cc: C. Ankrum
J. Balderston
V. Stonehocker

MAILGRAM SERVICE CENTER
MIDDLETOWN, VA. 22645

western union Mailgram

0529 46S112002 04/22/82 ICS IPMBNGZ CSP PTGA
1 5033554491 MGM TDBN BELOIT WI 04-22 0649P EST

Attachment 6
Page 1

BELOIT POWER SYSTEMS RKH
555 LAWTON
BELOIT WI 53511

THIS MAILGRAM IS A CONFIRMATION COPY OF THE FOLLOWING MESSAGE:

5033554491 MGM TDBN BELOIT WI 254 04-22 0649P EST
ZIP
UNITED STATES NUCLEAR REGULATORY COMMISSION,
ATTN NICK JACKIW
799 ROOSEVELT RD
GLEN ELLEN IL 60137

SUBJECT POTENTIAL FAILURE IN DIESEL GENERATOR SETS

IT HAS BEEN BROUGHT TO OUR ATTENTION THAT DIESEL GENERATOR SETS MANUFACTURED WITH COLT/FAIRBANKS MORSE ENGINE AND BELOIT POWER SYSTEMS GENERATORS M-A-Y HAVE A LOOSE STUD AND NUT COMBINATION ON THE SHAFT SPIDER ASSEMBLY DUE TO A POSSIBLE MISAPPLICATION OF MANUFACTURER'S TORQUING EQUIPMENT.

NOTE: THIS ONLY APPLIES TO BELOIT POWER SYSTEM IX FRAME GENERATORS, NO OTHER FRAME SIZES INVOLVED.

PLEASE DO THE FOLLOWING STEPS TO PRECLUDE ANY PROBLEMS.
STEP 1. PUT UNIT IN MAINTENANCE MODE PER INSTRUCTION MANUAL.
STEP 2. REMOVE GENERATOR COIL GUARDS BOTH ENDS.
STEP 3. LOCATE 14 STUD NUTS--3" HEX NUTS LOCATED ON THE SHAFT SPIDER ASSEMBLY.
STEP 4. LOCATE THE STUD NUMBERS, NUMBERED 1-14, MATCH MARK NUT FLATS TO MATING SURFACE SO AMOUNT OF MOVEMENT CAN BE DETERMINED. RETORQUE ALL NUT/STUD COMBINATIONS IN THE FOLLOWING SEQUENCE: 1, 6, 11, 2, 7, 12, 3, 8, 13, 4, 9, 14, 5, 10, AND REPEAT NUMBER 1 TO 5000PSI. MAKE SURE NUT OPPOSITE THE NUT BEING TORQUED DOES NOT TURN DURING THE TORQUING PROCESS. RECORD AMOUNT OF NUT ROTATION.
STEP 5. REASSEMBLE COIL GUARDS.
STEP 6. PUT UNIT BACK IN NORMAL OPERATION.
STEP 7. PLEASE FORWARD BACK TO MY ATTENTION THE UNIT SERIAL NUMBERS AND AMOUNT OF ROTATION OF EACH NUT IN DEGREES SO WE CAN HAVE A RECORD

Mailgram
western union

Attachment 6
Page 2

OF THE NEW TORQUE.

IF WE CAN FURTHER ASSIST YOU, PLEASE CALL ME AT 6083654491 OR AT MY HOME 8159435636.

SINCERELY,
LOUIS ALLIS
BELOIT POWER SYSTEMS
RICHARD K HAISLER
MANAGER, QUALITY ASSURANCE

1357 EST

MGMCOMP MGM

Attachment 7

END USERS

Alabama Power - S/N 503920R1, 503919R1,R2

II Farley Nuclear Plant
P. O. Drawer 470
Ashford, AL 36312
Attention: Mr. W. G. Hairston, III

I Millstone III - S/N 504376R1,R2

Stone & Webster Engineering Corp.
P. O. Box 2325
Boston, MA 02107
Attention: Lead Electrical Engineer
J. O. No. 12179

I Seabrook - S/N 700004R1,R2, 700005R1,R2

United Engineers & Constructors
P. O. Box 8223
Philadelphia, PA 19101
Attention: Mr. D. H. Rhoods
Project Engineering Manager (Seabrook)

I Beaver Valley - S/N 700002R1

Stone & Webster Engineering Corp.
P. O. Box 2325
Boston, MA 02107
Attention: Project Engineer for
Duquesne J. O. 12241

II Summer - S/N 700001R1,R2

South Carolina Electric & Gas Co.
P. O. Box 764
Columbia, SC 29218
Attention: Mr. Dan Nauman
Manager, Quality Assurance & Security

SNUPPS - S/N 700508R1,R2,R3,R4

I. Hope Creek Unit 1

Bechtel Power Corp.
P. O. Box 607
Gaithersburg, MD 20760
Attention: SNUPPS Project Engineer

WPPSS - S/N 700509R1,R2

Ebasco Services, Inc.
Two World Trade Center
82nd Floor
New York, NY 10048
Attention: F. J. E. Storey
Manager of Projects

III Marble Hill - S/N 700512R1,R2

Sargent & Lundy Eng.
55 E. Monroe Street
Chicago, IL 60603
Attention: P. L. Wattelet
Marble Hill Proj. Mgr.

PLAN TEST

Attachment 8

Test #A - Using shaft and spider assembly in the shop, install (1) new stud and nuts combination. Connect BPS torque equipment on one end and Colt's ratch equipment on the other. Torque and record readings for both torque devices at the following values: 2000, 3000, 3500, 4000, 4500 and 5000 ft-lb.

Test #B - Repeat Test #A but rotate BPS 4X multiplier head (1-1/2 socket drive) 90°.

Test #C - Same as Test #B but rotate head 90°.

Test #D - Using an existing shaft/spider assembly in shop that has been torqued - check existing torque and record values. Retorque with 100 lbs additional using BPS equipment. Recheck using the Colt ratch and verify that readings are the same.

Test #E - Increase torque on Hope Creek S/N 700510R3 100 PSI above previous recorded torque using BPS equipment.

Test #F - Using Colt equipment set the same value of torque used in Test #E to verify value.