Alabama Power Company
600 North 18th Street
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F. L. CLAYTON, JR.
Senior Vice President

Alabama Power
the southern electric system

March 17, 1980

Docket No. 50-364

Director of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Attention: Mr. John F. Stolz

JOSEPH M. FARLEY NUCLEAR PLANT - UNIT NO. 2
CONFIRMATORY PIPING ANALYSIS PROGRAM

Gentlemen:

Your letter dated February 20, 1980 contained a request for additional information that would allow an independent confirmatory piping analysis to be performed by your consultants on the main steam line, loop A, extending from the steam generator nozzle to the containment penetration. Accordingly, enclosed are two (2) copies of a documentation package that has been assembled to include the requested information as outlined in your February 20, 1980 letter. In addition, by copy of this letter we are transmitting one (1) copy of the documentation package directly to Mr. Merv Bampton, Battelle - Pacific Northwest Laboratories.

Please note that the stiffness value provided for support 2MS-R612 is subject to change since the structure is currently being modified in accordance with the requirements of IE Bulletin 79-14. We will advise if the given value associated with the proposed modification requires further revision. As a final comment, the seismic analysis that was performed on the A main steam line was a decoupled analysis. The methodology used to perform such an analysis was explained during a telephone conversation on February 11, 1980 between our staffs.

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Docket No. 50-364

It is our understanding that the primary emphasis of this independent analysis is to verify that the selected piping system design meets the applicable ASME Code stress criteria in the as-built condition.

Yours very truly,

F. L. Clayton, Jr.

FLCjr/TNE/mmb

Enclosures

cc: Mr. R. A. Thomas w/o encl.
Mr. G. F. Trowbridge w/o encl.
Mr. Merv Bampton w/encl.

1) APPLICABLE PORTIONS OF PIPE SPEC 55-1109-2

2) INSULATION WEIGHTS

3) FLUED HEAD DRAWINGS

SYSTEM DESIGNATION FOR JOSEPH M. FARLEY
NUCLEAR PLANT UNIT NO. 1

SERVICE NO.	SYSTEM
B13	REACTOR COOLANT PIPING
E11	RESIDUAL HEAT REMOVAL/LOW HEAD SAFETY INJECTION SYSTEM
E13	CONTAINMENT SPRAY SYSTEM
E14	CONTAINMENT AIR SAMPLING
E21	HIGH HEAD SAFETY INJECTION/CHEMICAL & VOLUME CONTROL SYSTEM
E22	REACTOR CAVITY POST LOCA DILUTION SYSTEM
E23	POST ACCIDENT CTMT VENTING & SAMPLING SYSTEM
F16	SERVICE & HANDLING OF STORAGE EQUIPMENT
G12	BORON THERMAL REGENERATION SYSTEM
G21	LIQUID WASTE DISPOSAL SYSTEM
G22	GAS WASTE DISPOSAL SYSTEM
G24	STEAM GENERATOR BLOWDOWN SYSTEM
G31	SPENT FUEL POOL COOLING AND CLEAN UP SYSTEM
N11	MAIN STEAM SYSTEM
N12	AUXILIARY STEAM SYSTEM
N13	SERVICE STEAM SYSTEM
N21	CONDENSATE AND FEEDWATER SYSTEM
N22	AUXILIARY DRAINS AND VENTS SYSTEM
N23	AUXILIARY FEEDWATER SYSTEM
N25	CHEMICAL INJECTION SYSTEM
N26	MSR AND HEATER DRAINS
N32	STEAM SEAL SYSTEM
N33	LUBE OIL SYSTEM
N34	MOISTURE SEPARATOR SYSTEM
N35	EXTRACTION STEAM SYSTEM
N36	BY-PASS STEAM SYSTEM
N37	REHEAT SYSTEM
N51	CONDENSER AND AUXILIARIES
N52	OFF GAS SYSTEM
P11	CONDENSATE AND DEMIN. WATER TRANSFER AND STORAGE SYSTEM
P12	MAKE-UP WATER SYSTEM
P13	CONTAINMENT PURGE SYSTEM
P14	NITROGEN AND HYDROGEN SYSTEM
P16	SERVICE WATERS SYSTEM
P17	COMPONENT COOLING SYSTEM
P18	SERVICE AIR SYSTEM
P19	INSTRUMENT AIR
P20	AUX. STM. & COND. RECOVERY SYSTEM
P21	DIESEL AND AUXILIARIES
P23	CONTAINMENT LEAK RATE TEST SYSTEM
P24	SANITARY WATER SYSTEMS
P25	RIVER WATER SYSTEM
P26	CIRCULATING WATER SYSTEM
P27	WATER TREATMENT SYSTEM
P28	DEGASIFICATION SYSTEM
P35	CONDENSER TUBE CLEANING SYSTEM

BECHTEL CORP. JOB 7597-03 SOUTHERN SERVICES INC.

DR	NO.	DATE	REVISION
TR	1	2-6-73	General Revision
CK	2	2-12-73	Added P20
	3	4-9-73	Rev. P11 Add P24
	4	11-7-73	Added New System
APP	5	7/27/76	Added New System
DATE	SUPERSEDES		SCALE

ALABAMA POWER COMPANY
SUBJECT JOSEPH M. FARLEY NUCLEAR PLANT
DETAIL SYSTEM DESIGNATIONS
SH. 1 OF 32 SHEETS
A-

6 7/23/79 Added P28 & P35 Systems

SYSTEM DESIGNATION FOR JOSEPH M. FARLEY
NUCLEAR PLANT UNIT NO. 1 (CONT'D)

SERVICE NO.	SYSTEM
P42	PLANT HOT WATER HEATING SYSTEM
P43	FIRE PROTECTION SYSTEM
P44	REFUELING WATER TRANSFER AND STORAGE
4 R43	DIESEL GENERATOR AIR START SYSTEM
S42	DOMESTIC WATER
S44	SANITARY SYSTEM
T42	DOMESTIC WATER SYSTEM (CONTAINMENT)
T46	STANDBY GAS TREATMENT SYSTEM
T47	CRDM COOLING SYSTEM
U09	DEWATERING (TURB. BLDG.)
U27	ROOF DRAINS (TURB. BLDG.)
4 U41	HVAC PIPING
U42	DOMESTIC WATER SYSTEM (TURB. BLDG.)
U43	FIRE PROTECTION SYSTEM
U44	SANITARY SYSTEM
V19	CLOSED LOOP AUX. STEAM & CONDENSATE RECOVERY SYSTEM
V27	ROOF DRAINS (AUX. BLDG.)
V42	DOMESTIC WATER SYSTEM (AUX. BLDG.)
V43	FIRE PROTECTION SYSTEM
V49	CONTROL ROOM HVAC AND FILTRATION SYSTEMS
W09	DEWATERING (ARC WATER)
W27	CHLORINATION SYSTEM
W32	SCREEN WASH SYSTEM
W36	SERVICE WATER INTAKE STRUCTURE
W43	FIRE PROTECTION SYSTEM
X44	SANITARY DRAIN SYSTEM
Y09	DEWATERING (YARD)
5 Y16	WATER TREATMENT
Y36	SANITARY WATER (YARD) SYSTEM
Y37	HYDROGEN HOUSE
Y43	FIRE PROTECTION SYSTEM
Y44	SANITARY DRAIN SYSTEM
Y45	RADIOACTIVE DRAIN SYSTEM
Y52	OIL & CHEMICAL STORAGE AND TRANSFER SYSTEM

BECHTEL CORP. JOB 7597-03 SOUTHERN SERVICES INC.

NO.	DATE	REVISION
1	7-26-73	Gen'l. Revision
2	4-19-73	S42
3	11-7-73	Add. New Systems
4	7-23-76	Add. New Systems
5	7-23-79	Add. Y36 System

DR TR CK APP DATE

ALABAMA POWER COMPANY
SUBJECT JOSEPH M. FARLEY NUCLEAR PLANT
DETAIL SYSTEM DESIGNATIONS
SUPERSEDES SCALE SH. 2 OF 32 SHEETS A-

GENERAL NOTES

1. PIPING CLASS CODE DEFINITION

1.1 Piping Classes are designated by a three letter code. The first letter indicates the Primary Valve and Flange rating; the second letter the type of material and the third letter the code to which the piping is designed.

1.2 The designations are as follows:

First Letter - Rating

C - 1500#
D - 900#
E - 600#
F - 400#
G - 300#
H - 150#
J -
K - For general use as designated
L - on pipe class sheets
M -

Second Letter - Mat'l.

B - Carbon Steel
C - Stainless Steel
D - Cast Iron
E - For general use
F - as designated
N - on Class Sheet

Third Letter - Design Code

A - ASME Code, 1971, Section III, Nuclear Power Plant Components Class 1
B - Class 2
C - Class 3
D - Code for Power Piping, ANSI B31.1.0
G - Portion of ANSI B 31.1.0 applicable to Roof Drains.

BECHTEL CORP. JOB 7597-03 SOUTHERN SERVICES INC.

DR	NO.	DATE	REVISION
TR			
CK			
APP			
DATE			

ALABAMA POWER COMPANY

SUBJECT JOSEPH M. FARLEY NUCLEAR PLANT

DETAIL PIPING CLASS SHEETS-GENERAL NOTES

SUPERSEDES _____ SCALE _____ SH. 3 OF 32 SHEETS

A-

CLASS & SERVICE NUMBER	SERVICE Rev. 5 2/6/75 Added HBD-605 Rev. 6 6/17/76 Added HBD-623 and EBC-3 Rev. 4 9-5-74 Added 211 through 213 Rev. 7 7/23/76 Editorial Chg.	SEISMIC CLASS	DESIGN RATING		SERVICE CONDITION		DRAWING NUMBER
			PSIG	°F	NORMAL PSIG	NORMAL °F	
N-11	MAIN STEAM SYSTEM						
EBB-6	Main Steam Drip Leg Drains	I	1085	600	775	517	D-175324 5
HBD-503	Drains to Aux Steam Cond. Tank	II	150	500	Gravity	212	D-175324 5
HBD-504	Drains to Drain	II	150	500	Gravity	212	D-175324 5
EBD-7	Main Steam Drip Leg Drains	II	1085	600	775	517	D-175324 5
HBD-505	Drains to Aux. Steam Cond. Tank	II	150	500	Gravity	212	D-175324 5
HBD-506	Drains to Drain	II	150	500	Gravity	212	D-175324 5
EBD-8	Main Steam Drip Leg Drains	II	1085	600	775	517	D-175324 5
HBD-507	Drains to Aux. Steam Cond. Tank	II	150	500	Gravity	212	D-175324 5
HBD-508	Drains to Drain	II	150	500	Gravity	212	D-175324 5
(8) EBB-7	Steam Generator Upper Shell Sample Conn.	I	1085	600	775	517	D-175324 D-175325
(2) EBD-9	Main Steam Line Sample	II	1085	600	775	517	D-175324 D-175325
DBD-8	Temp. Stm. Gen. Bypass piping for chem. cleaning (Unit 1)	II	1085	600	1085	200	
(3) EBD-10	Temp. Stm. Gen. Bypass piping for chem. cleaning (Unit 2)	II	1085	600	1085	200	
EBD-211	M.S. Line to Air Ejectors Drain	II	1085	600	750	510	D-170295
(4) EBD-212	Main Stm. Drain Pot Drains	II	1085	600	750	510	D-170295
EBD-213	Dump Valve Disch Line Drains	II	1085	600	750	510	D-170295
(5) HBD-605	Emergency Air Supply to Atmos. Relief Valve	I	150	150	100	95	
(6) HBD-623	Nitrogen supply to main stream header	II	150	500	135	120°	
EBC-3	Atmospheric Dump Valve Discharge to Atmosphere	I	1085	600	775	517	

BECHTEL CORP. JOB 7597-03 — SOUTHERN SERVICES INC.

NO.	DATE	REVISION
1	1-2-73	New Sheet
2	7-18-73	Added EBB-7, EBD-9
3	6-15-74	Added DBD-8 & EBD-10

DR ADM
TR
CK
APP
DATE
SUPERSEDES
SCALE

ALABAMA POWER COMPANY
SUBJECT JOSEPH M. FARLEY NUCLEAR PLANT
DETAIL PIPING CLASS SUMMARY
SH 534 OF SHEETS
A-

Rev. 8 8/31/76 Seismic Class

CLASS & SERVICE NUMBER	SERVICE	SEISMIC CLASS	DESIGN RATING		SERVICE CONDITION		DRAWING NUMBER
					NORMAL		
			PSIG	°F	PSIG	°F	
N11	Main Steam						
EBD-218	MSR 1A & 2A H. P. Steam Drain	II	1085	600	775	517	D170171
EBD-219	MSR 1B & 2B H. P. Steam Drain	II	1085	600	775	517	D170171
EBD-220	SGFP Turbine H. P. Steam Drain	II	1085	600	775	517	D170171
EBD-221	SGFP Turbine H. P. Steam Drain	II	1085	600	775	517	D170171
EBD-223	Seal System Main Steam Drains	II	1085	600	775	517	D170171
HBD-657	Main Steam Safety Valve Discharge to Atmosphere.	I	150	500	80	325	
EBD-12	MS Safety Valve Discharge Elbow	I	1085	600	150	370	

BECHTEL CORP. JOB 7597-03 — SOUTHERN SERVICES INC.

NO.	DATE	REVISION
0	7/23/76	New Sht.
1	10/4/76	Add HBD-657 & EBD-12

DR
TR
CK
APP
DATE

ALABAMA POWER COMPANY

SUBJECT: JOSEPH M. FARLEY NUCLEAR PLANT

DETAIL: PIPING CLASS SUMMARY

SUPERSEDES _____ SCALE _____ DWL 538 OF ____ SHEETS

A-

CLASS & SERVICE NUMBER	SERVICE Rev. 6 7/15/75 Added EBD-11 Rev. 7 10/4/76 Del. HBC-85 & EBC-5 Rev. 5 6-15-74 Added Ratings	SEISMIC CLASS	DESIGN RATING		SERVICE CONDITION		DRAWING NUMBER
			PSIG	°F	NORMAL PSIG	NORMAL °F	
N11	MAIN STEAM SYSTEM						
EBB-1 ⚠1	Main Steam from Steam Generators to Mn. Steam Safety Valve Header	I	1085	600	775	517	175300-175302
EBB-3	Main Steam Safety Valve Headers	I	1085	600	775	517	175324/5
EBD-3	Main Steam Supply from Isol. Valves to Aux. Bldg. Wall	II	1085	600	775	517	
EBD-200	Main Steam Supply from Aux. Bldg. Wall to: 1)H.P. Turbine 2)MSR 2nd Stage 3)Rotor Gland Steam Seal H.P. Supply Conn. 4)Feedwater Pump Turbines ⚠1 5)SJAE Supply Conn. ⚠3 6)Condenser Sparging System Control Valve ⚠1 7)By-Pass Shut-Off Valve Ahead of Control Valve	II	1085	600	775	517	170114
⚠2 ⚠4 HBC-85	Deleted						
⚠6 EBD-11	From N_2 supply to main steam header	II	1085	600	775	517	
HBD-200 ⚠1	From Sparging System Control Valve to Sparging Nozzles at Condenser	II	150	600	100	517	170114
⚠3 GBD-200 ⚠1	From MSR Shell to SGFP Turbine	II	265	515	208	490	170114
EBB-4	From drip leg to Aux. Cond. Tank						
⚠2 ⚠4 EBC-5 ⚠1	Deleted						⚠5

BECHTEL CORP. JOB 7597-03 — SOUTHERN SERVICES INC.

DR	TR	CK	APP	DATE

NO.	DATE	REVISION
1	7-26-72	[illegible]
2	1-12-73	EBC-5 was EBD
3	1-29-73	Del. EBD-200-6 & HBD-215

ALABAMA POWER COMPANY

SUBJECT: JOSEPH M. FARLEY NUCLEAR PLANT

DETAIL: PIPING CLASS SUMMARY

SUPERSEDES _____ SCALE _____ SH. 53 OF ____ SHEETS — A-

4 8-16-73 Add Samp Cond

Rev. 9 4/22/77 Add Blue African

Class EBB
ASME Code Sect. III Class 2
Main Steam

PRIMARY FLANGE AND VALVE RATING
600 PSIG@ 850F
Carbon Steel

PIPE:	Size	2" and smaller	2½" thru 24"	32" O.D.*
	Construction	Seamless	Seamless	Welded
	ASME Spec.	SA106 B	SA106 B	SA155 Gr. KCF-70 Class 1
	Schedule	80	80	1.033" Minimum wall*
FITTINGS**	Size	2" and smaller	2½" thru 24"	32" O.D.
	Type	Forged	Seamless or Welded	Seamless or Welded
	Joint	@ Socket Weld	Butt Weld	Butt Weld
	ASME Spec.	SA-181 Gr II, A-105-71 Code Case 1519 or SA234	SA234 - WPB	SA234 WPC
	Rating	3000#	Schedule 80	1.033" Minimum wall
FLANGES:	Size	2" and smaller	2½" thru 24"	
	Type	Forged	Forged	
	Joint	Socket Weld	Weld Neck	
	ASME Spec.	SA105 Gr. II	SA105 Gr. II	
	Rating	600# RF	600# RF	
	Bored to	Schedule 80	Schedule 80	

GASKETS: Flexitallic style CG, Type 304 stainless steel and Canadian asbestos filler, except that Mn. Stm Safety Valve gaskets shall have Blue African Asbestos or grafoil. (4)

BOLTING: Type - Stud bolts with two nuts
Stud - ASME SA193 Grade B-7
Nut - ASME SA194 Grade 2H, hexagon, semi-finished

JOINTS: Welded except at flanged equipment.
Field weld end preparation per sheet 1 of 10.
Weld end transition per sheet 1 of 1, type I.
Branch connections per sheet 2 of 2.
**Reducing couplings shall be used for piping over 600 psi
Inserts may be used in other locations

CORROSION ALLOWANCE: The above schedules and minimum wall thicknesses include 0.065" corrosion allowance.

NOTE 1: All piping and associated welding filler metal which is part of containment penetration shall be impact tested at +10° F. Impact tests are not required for pipe ½ in. or less in nominal wall thickness or 6 in. nominal diameter and less. Acceptable values shall be those listed in Table I-7.1 of the Nuclear Code.

*Minimum wall thickness for main steam safety valve header shall be 2.312"; nominal O.D. for header shall be 34.5"

NOTE 2: A butt weld may be used where a reducer is required.

BECHTEL CORP. JOB [illegible] SOUTHERN SERVICES INC.

DR JTM	NO.	DATE	DESCRIPTION
TR	1	9-11-7[illegible]	Has Grade "B"
CK	2	10-16-72	Add Canadian
	3	1-16-73	**Red. Cplg.Note
APP	4	1-29-73	Del.32" Flg.
DATE	5	6-14-73	Fitting Material

ALABAMA POWER COMPANY
SUBJECT JOSEPH M. FARLEY NUCLEAR PLANT
DETAIL Piping Class Sheet
SUPERSEDES _____ SCALE _____ SH. 14 OF 32 SHEETS
A-

6 8/3/73 Note 2 7 9-12-73 Gaskets 8 3/1/77 Gaskets

Class EBC
ASME Code Sect. III Class 3
Auxiliary Steam

PRIMARY FLANGE AND VALVE RATING
600 PSIG @ 850F
Carbon Steel

PIPE:		Size	2" and smaller	2½" thru 24"	32" O.D.
		Construction	Seamless	Seamless	Welded
		ASME Spec.	SA106 B	SA106 B	SA155 Gr. KCF-70 Class 1
		Schedule	80	80	1.033" Minimum wall
FITTINGS:	* 3	Size	2" and smaller	2½" thru 24"	32" O.D.
	3	Type	Forged	Seamless or Welded	Seamless or Welded
		Joint	@ Socket Weld	Butt Weld	Butt Weld
	5	ASME Spec.	SA-181 Gr II, A-105-71 Code Case 1513 or SA234 WPB	SA234 WPB	SA234 WPC
		Rating	3000#	Schedule 80	1.033" Minimum Wall
FLANGES:		Size	2" and smaller	2½" thru 24"	
		Type	Forged	Forged	
		Joint	Socket Weld	Weld Neck 4	
		ASME Spec.	SA105 Gr. II	SA105 Gr. II	
		Rating	600# RF	600# RF	
		Bored to	Schedule 80	Schedule 80	

GASKETS: 2 Flexitallic style CG, Type 304 stainless steel and Canadian asbestos filler.

BOLTING: 1
Type - Stud bolts with two nuts
Stud - ASME SA193 Grade B-7
Nut - ASME SA194 Grade 2H, hexagon, semi-finished

JOINTS:
Welded except at flanged equipment.
Field weld end preparation per sheet 1 of 10.
Weld end transition per sheet 1 of 1, type I.
Branch connections per sheet 2 of 2.
3 *Reducing couplings shall be used for piping over 600 psi
Inserts may be used in other locations

CORROSION ALLOWANCE: The above schedules and minimum wall thicknesses include 0.065" corrosion allowance.

6 @ NOTE 1: A butt weld may be used where a reducer is required.

Rev 5	6-14-73	Fitting Material	Rev. 6	7/3/73	NOTE 1

BECHTEL CORP. JOB 7597-03 — SOUTHERN SERVICES INC.

NO.	DATE	REVISION
1	9-11-72	Studs were "Grade B"
2	10-[illegible]-72	Added "Canadian"
3	1-16-73	*Red. Cplg. Note
4	1-29-73	Del.32" Flange

DR ..... TR ..... CK ..... APP ..... DATE .....

ALABAMA POWER COMPANY
SUBJECT JOSEPH M. FARLEY NUCLEAR PLANT
DETAIL Piping Class Sheet

SUPERSEDES ..... SCALE ..... SH. 15 OF 32 SHEETS

A

Class EBD
** ANSI B 31.1.0, Class II & III
Main Steam
Main Feedwater
Non-Nuclear

PRIMARY FLANGE AND VALVE RATING
600 PSIG @ 850F
Carbon Steel

PIPE:	Size	2" and smaller	2½" thru 24"*	26"/30"/32"/34"/36" O.D.
	Construction	Seamless	Seamless	Welded
	ASTM Spec	A-106B	A-106C *	A-155 Gr. KCF-70 Class 1
	Schedule	80	60*	1.000"/1.018"/1.033"/ 1.093"/1.154" min. wall
FITTINGS: ***	Size	2" and smaller	2½" thru 24"	26"/30"/32"/34"/36" O.D.
(4)	Type	Forged	Seamless or Welded	Seamless or Welded
	Joint @	Socket Weld	Butt Weld	Butt Weld
(6)	ASTM Spec.	A-181 Gr II, A-105-71 or A 234 Gr. WPB	A-234-WPC	(3) A-234-WPB from A515GR.70 or A-234-WPC
	Rating	3000#	Schedule 60*	1.000"/1.018"/1.033"/ 1.093"/1.154" min. wall
FLANGES:	Size	2" and smaller	2½" thru 24"	
	Type	Forged	Forged	
	Joint	Socket Weld	Weld Neck	
	ASTM Spec.	A-105 Gr. II	A-105 Gr. II	(5)
	Rating	600# RF	600# RF	
	Bored to	Schedule 80	Schedule 60*	

GASKETS: (2) Flexitallic style CG, Type 304 Stainless Steel and Canadian asbestos filler.

BOLTING: Type - Stud bolts with two nuts
Stud - ASTM A-193 Grade B-7
Nut - ASTM A-194 Grade 2H, hexagon, semi-finished

JOINTS: Welded except at flanged equipment.
Field weld end preparation per sheet 4 of 10.
Weld end transition per sheet 1 of 1, type I.
Branch connections per sheet 2 of 2.

(4) *** Reducing couplings shall be used on piping over 600 psi
Inserts may be used in other locations

QUALITY CONTROL AND ASSURANCE REQUIRED

CORROSION ALLOWANCE: (8) The above schedules and minimum wall thicknesses include 0.065" corrosion allowance, except that 14" pipe wall includes 0.017" Corrosion Allowance.

*Note: All 24" steam generator feedpump discharge piping to be A-155 Gr. KCF-70 Class I, 1.000" min. wall. For sizes smaller than 8" use Schedule 80.

**For clarification, see applicable class summary sheet.

Rev 6	6-14-73	Fitting Material	Rev. 7	8-3-73	[illegible] 2	Rev. 8 6-17-74 Cor. Allow

NOTE 2: A butt weld may be used where a reducer is required.

BECHTEL CORP. JOB 7597-03 — SOUTHERN SERVICES INC.

NO.	DATE	REVISION
1	7-24-72	Add Safety V. Disch
2	10/16/72	Added "Canadian"
3	1/8/73	Fitting Spec.
4	1-18-73	***-Deleted
5	1-29/73	Del. large Figs.

DR
TR
CK
APD
DATE JUL 26 1973

ALABAMA POWER COMPANY
SUBJECT JOSEPH M. FARLEY NUCLEAR PLANT
DETAIL Piping Class Sheet

SUPERSEDES — SCALE — SH. 16 OF 32 SHEETS — A-

Class DBD
**ANSI B31.1.0, Class II and III
Main & Aux. Feedwater
Non-Nuclear

PRIMARY FLANGE AND VALVE RATING
900 PSIG @ 850F
Carbon Steel

PIPE:	Size	2" and smaller	3" to 6"	8" thru 18"
	Construction	Seamless	Seamless	Seamless
5	ASTM Spec.	A106-68 Grade B	A106-68 Grade C	A106-68 Grade C
	Schedule	80	80	100
2	FITTINGS: ***Size	2" and smaller	3" to 6"	8" thru 18"
	Type	Forged	Seamless or Welded	Seamless or Welded
	Joint	@ Socket Weld	Butt weld	Butt weld
3	ASTM Spec.	A-181 Gr II, A-105-71 or A-234 WPB	A234-65 WPC	A234-65 WPC
	Rating	3000#	Schedule 80	Schedule 100
FLANGES:	Size	2" and smaller	3" to 6"	8" thru 18"
	Type	Forged	Forged	Forged
	Joint	Socket weld	Welding Neck	Welding Neck
	ASTM Spec.	A105-68 Gr. II	A105-68 Gr. II	A105-68 Gr. II
	Rating	900# R. F.	900# R. F.	900# R. F.
	Bored to	Match Pipe	Match Pipe	Match Pipe

GASKETS: 1 Flexitallic gasket style CG, Type 304 Stainless Steel and Canadian asbestos filler.

BOLTING:
Type - Stud bolts with two nuts
Stud - ASTM A193-70 Gr. B7
Nut - ASTM A194-69 Gr. 2H, hexagon, semi-finished

JOINTS:
Welded except at flanged equipment.
Field weld end preparation per sheet 3 of 10.
Weld end transition per sheet 1 of 1, type I.
Branch connections per sheet 2 of 2.
2 ***Reducing couplings shall be used for piping over 600 psi
Inserts may be used in other locations

CORROSION ALLOWANCE: The above schedules include 0.065" corrosion allowance.

**For clarification, see applicable class summary sheet.
4 @ NOTE 1: A butt weld may be used where a reducer is required.

BECHTEL CORP. JOB 7597-03 — SOUTHERN SERVICES INC.

NO.	DATE	REVISION
1	10/16/72	Added "Canadian"
2	1-16-73	*Red. Cplg. Note
3	5-14-73	Fitting Material
4	8-3-73	Note 1
5	9/17/73	Was Grade C

DR ..... TR ..... CK ..... APP ..... DATE .....

ALABAMA POWER COMPANY
SUBJECT JOSEPH M. FARLEY NUCLEAR PLANT
DETAIL Piping Class Sheet

SUPERSEDES _____ SCALE _____ SHEET 12 OF 32 SHEETS — A-

Rev. 7 11-8-74 Added Note 3

Class HBC
ASME Code Section III Class 3

PRIMARY FLANGE AND VALVE RATING
150 PSIG at 500°F

Carbon Steel

PIPE:	Size	½" to 10"		12" to 36" (1)
	Construction	Seamless		Seamless or welded
	ASME Spec.	SA106 Gr. B		SA106 Gr. B SA155 Class IIGr.C5
(3)	Schedule	40 **		(2) Std. 3/8" wall*
FITTINGS:	Size	2" and smaller	2½" to 10"	12" to 36" (1)
	Type	Forged	Seamless or welded	Seamless or welded
	Joint	@ Socket weld	Butt weld	Butt Weld
(3) (5)	ASME Spec.	SA-181 Gr II, A-105-71 Code Case 1519 or SA234 WPB	SA234-65 WPA or WPB	SA234 WPA or WPB
	Rating	3000 lb.	Schedule 40	Std 3/8" wall
FLANGES:	Size	2" and smaller	2½" to 10" ***	12" to 36" 1 4
	Type	Forged	Forged	Forged
	Joint	Socket Weld	Weld neck	Weld neck
	ASME Spec.	SA181 or SA105	SA181 or SA105	SA181 or SA105
	Rating	150 lb. R.F.	150 lb. R.F.	150 lb. R.F.
	Bored to	Schedule 40	Schedule 40	Match pipe

GASKETS: Compressed asbestos, rubber bonded flat ring, 1/16" thick, dimensions to ANSI B16.21.

BOLTING: Type - Stud bolts with two nuts
Stud - ASME SA193 Gr. B7
Nut - ASME SA194 Gr. 2H, hexagon, Semi-finished

JOINTS: Welded except at flanged equipment connections
Field weld end transition per sheets 1 and 2 of 10.
Weld end transition per sheet 1 of 1, type I.
Branch connections per sheet 1 of 2.

CORROSION ALLOWANCE: The above schedules include 0.065" corrosion allowance.

(1) NOTE 3: Permanent backing rings are permissible on 12" and larger dia. service water piping outside the buildings.

(2) NOTE 1: All buried service water piping from 30" to 36" diameter to be 0.500" wall.

(3) ** For sizes 2½" & 3" Schedule 80 pipe is permissible

(4) *** For flange size greater than 24" use Large Diameter ANSI-type flange class 125 R.F. per Tube Turns Large Diameter Flange or equal. (Drilled to ANSI B 16.1)

(5) @ NOTE 2: A butt weld may be used where a reducer is required.

Rev 5	6-14-73	Fitting Material	Rev. 6	-1-73	ote 2	

BECHTEL CORP. JOB 7597-03 — SOUTHERN SERVICES INC.

	NO.	DATE	REVISION
DR			
TR	1	7 2[illegible] 7[illegible]	Add 36"
CK	2	[illegible] 21 72	Added NOTE
	3	[illegible] 7[illegible]	Added Gr. II and **
APP			
DATE	4	1-29-73	Added ***

ALABAMA POWER COMPANY

SUBJECT JOSEPH M. FARLEY NUCLEAR PLANT

DETAIL Piping Class Sheet

SUPERSEDES _____ SCALE _____ SH. 24 OF 32 SHEETS

A-

Rev. 6 6-15-74 Per SM-133

Class HBD
ANSI B31.1.0
Class III
Non-Nuclear

PRIMARY FLANGE AND VALVE RATING
150 PSIG at 500°F

Carbon Steel

PIPE:	Size	½" to 10"		12" to 26"/30" to 48"
	Construction	Seamless		Seamless or welded
	ASTM Spec	A106 Gr. B (6) A53 Gr. B may be used for ½" instr. & service air piping.		A106 Gr. B; or A155 Class II Gr. C55
	Schedule	40		(2) Std. 3/8" wall/0.500" wall*
FITTINGS:	Size	2" and smaller	2½" to 10"	12" to 26"/30" to 48"
	Type	Forged	Seamless or welded	Seamless or welded
	Joint	@ Socket weld	Butt weld	Buttweld
(4)	ASTM Spec	A-181 Gr II, A-105-71 or A 234 WPB	A234 WPA or WPB	A234 WPA or WPB
	Rating	3000 lb.	Schedule 40	Std. 3/8" wall/0.500" wall
FLANGES:	Size	2" and smaller	2½" to 10" (3)	** 12" to 26"/30" to 48"
	Type	Forged	Forged	Forged
	Joint	Socket weld	Weld neck	Weld neck
	ASTM Spec	A181 or A105	A181 or A105	A181 or A105
	Rating	150 lb. R.F.	150 lb. R.F.	150 lb. R. F.
	Bored to	Schedule 40	Schedule 40	Std. 3/8" wall/0.500" wall

GASKETS: Compressed asbestos, rubber bonded flat ring, 1/16" thick, dimensions to ANSI B16.21.

BOLTING: Type - Stud bolts with two nuts
Stud - ASTM A193 Gr. B7
Nut - ASTM A194 Gr. 2H, Hexagon, semi-finished

JOINTS: Welded except at flanged equipment connections.
Field weld end transitions per sheets 6 and 7 of 10.
Weld end transition per sheet 1 of 1, type ...
Branch connections per sheet 1 of 2.

(5) (NOTE 2: ... butt weld ... be used where reducer is required.

(1) NOTE1: (2) All above ground service water piping from 12" to 36" dia. to std. 3/8" wall.

CORROSION ALLOWANCE: The above schedules include 0.065" corrosion allowance.

(3) ** For flange size greater than 24" use Large Diameter ... type flange class 125 R.F. per Tube Turns Large Diameter Flange or equal. (Drilled to ... B 16.1)

BECHTEL CORP. JOB 7597-03 — SOUTHERN SERVICES INC.

DR	NO.	DATE	REVISION
TR	1	7-26-72	Add NOTE
CK	2	10-31-72	Added "above ground"
APP	3	11-29-73	Added **
DATE	4	6-1-75	Fitting Material

SUPERSEDES ____ SCALE ____ SH. 25 OF 32 SHEETS

ALABAMA POWER COMPANY
SUBJECT JOSEPH M. FARLEY NUCLEAR PLANT
DETAIL Piping Class Sheet

A-

Class GBD
ANSI B31.1.0.
Class III Non-Nuclear

PRIMARY FLANGE AND VALVE RATING

△5 300 PSIG at 750°F
CARBON STEEL

PIPE:	SIZE	2" and smaller	2½" thru 24"	26"/30"/36" O.D.
	CONSTRUCTION	Seamless	Seamless	Welded
	ASTM SPEC	A-106B	A-106B	A-155 KCF-70 Cl. II
	SCHEDULE	80	40	0.625/0.750/0.875 min. wall
FITTINGS:	SIZE	2" and smaller	2½" thru 24"	26"/30"/36" O.D.
	TYPE	Forged	Seamless or Welded	Seamless or Welded
	JOINT	@ Socket Weld	Butt Weld	Butt Weld
△3	ASTM SPEC.	A-181 Gr II, A-105-71 or A234 WPB	A-234-WPB	A-234-WPB
	Rating	3000#	Schedule 40	Match Pipe
FLANGES:	SIZE	2" and smaller	2½" thru 24"	
	TYPE	Forged	Forged	
	JOINT	Socket Weld	Weld Neck	△2
	ASTM SPEC	A105 Gr. II	A105 Gr. II	
	RATING	300# R. F.	300# R. F.	
	BORED TO	Schedule 80	Schedule 40	

GASKETS: △1 Flexitallic gasket style CG, Type 304 stainless steel and Canadian asbestos filler.

BOLTS: Type - Stud bolts with two nuts
Stud - ASTM A193 Gr. B7
Nut - ASTM A194 Gr. 2H, hexagon, semi-finished

JOINTS: Welded except at flanged equipment connections.
Field weld end preparation per sheet 5 of 10.
Weld end transition per sheet 1 of 1, type I.
Branch connections per sheet 1 of 2.

CORROSION ALLOWANCE: The above schedules and minimum wall thicknesses include 0.065" corrosion allowance.

△4 @ NOTE 1: A butt weld may be used where a reducer is required.

Rev. 5 10/4/76 Rev. Des. Temp.

BECHTEL CORP. JOB 7597-03 — SOUTHERN SERVICES INC.

NO.	DATE	REVISION
1	10/14/72	Added "Canadian"
2	1-29-73	Del. Flanges larger than 24"
3	6-14-73	Fitting Material
4	8-3-73	

DR ..... TR ..... CK ..... APP ..... DATE .....

ALABAMA POWER COMPANY
SUBJECT JOSEPH M. FARLEY NUCLEAR PLANT
DETAIL PIPING CLASS SHEETS

SUPERSEDES ..... SCALE ..... SH. 19 OF 32 SHEETS A-

MAR 19 1974

Mr. H. A. Sindt
Project Manager
Westinghouse Nuclear Energy Systems
Post Office Box 355
Pittsburgh, Pennsylvania 15230

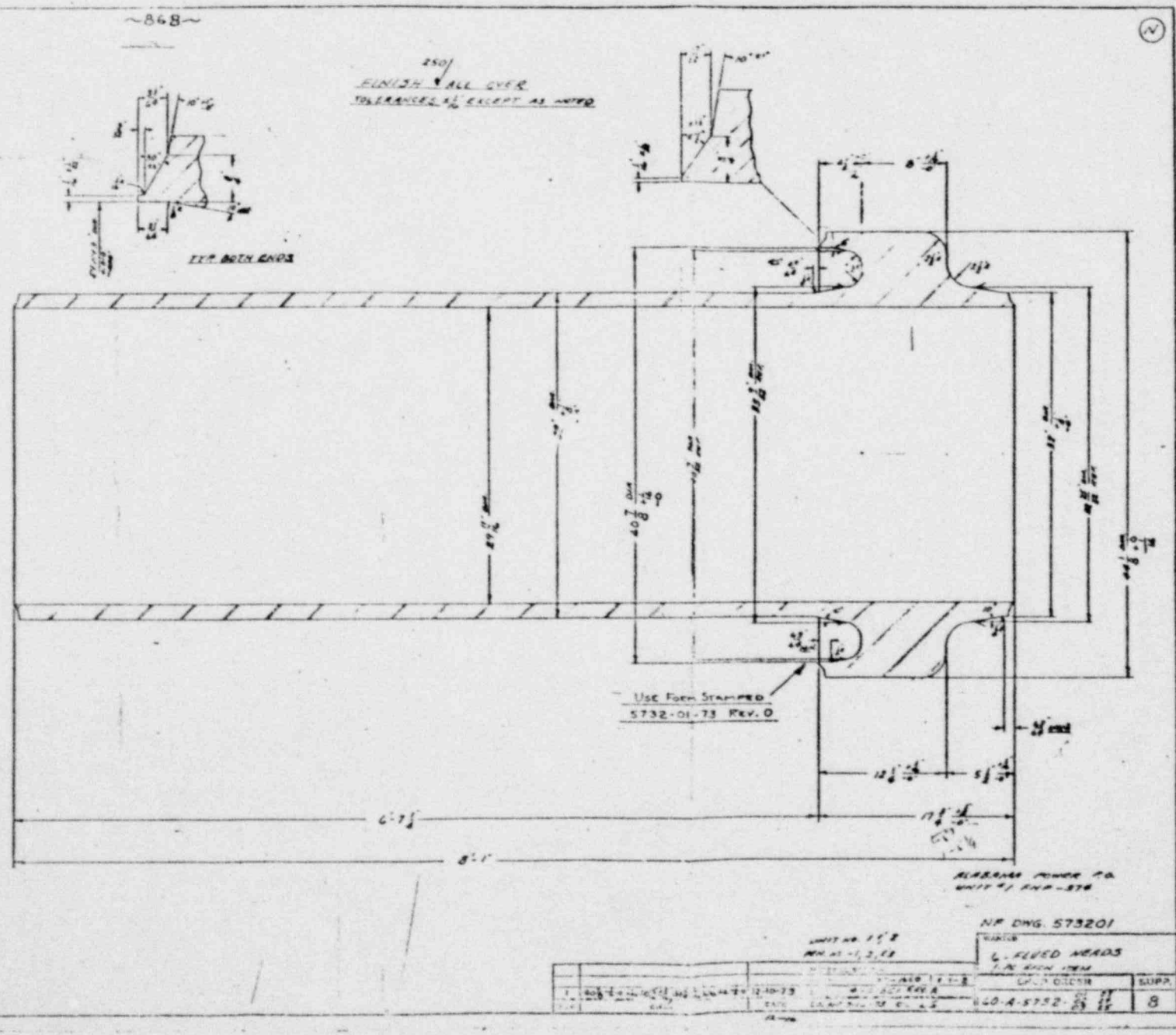
Dear Mr. Sindt:

Joseph M. Farley Nuclear Plant Units 1 & 2
Bechtel Jobs 7597-03/20
Reactor Coolant Loop Analysis
Bechtel File M-69
W-916

Per your request at the Nuclear Class 1 analysis meeting of March 15, 1974, we are furnishing the fabricators estimate on the weight of insulation per linear footage according to pipe sizes and systems. They are as listed:

SYSTEMS	PIPE SIZE	LINE NUMBERS	WEIGHT OF INSULATION PER LINEAR FOOT
Reactor Coolant	31"	CCA-12	37 lbs/ft.
Reactor Coolant	29"	CCA-11	35
Reactor Coolant	27.5"	CCA-10	29
RTD Manifold	1"		4
RTD Manifold	2"	CCA-13, 14	6
RTD Manifold	3"	CCA-19	7
Feedwater	14"	DBB-1	17
Main Steam	32"	EBB-1	38
Pressurizer Relief	6"	CCA-20	11
Pressurizer Spray	4"	CCA-15	8
Pressurizer Surge	14"	CCA-18	21
Residual HT Removal	12"	CCA-16	17
Safety Injection	6"	CCA-22, 27, 28	6
CVCS Charging Lines	3"	CCA-7	6
Alternate Charging Lines	3"	CCA-6	6
Alternate Press. Spray	2"	CCA-9	5
CVCS Letdown	3"	CCA-5	7
CVCS Excess Letdown	1"	CCA-4	3.5
Accumulator	12"	CCA-24	17

~868~



UNIT #1

Penetration Flued Head fittin
Main Steam

P.O. ITEM	PEN. NO.	TOTAL PLANT
1	1	QIN11X32" E
1	2	QIN11X32" E
1	3	QIN11X32" E

FINAL

SEISMIC DYNAMIC ANALYSIS

CONTAINMENT & INTERNAL

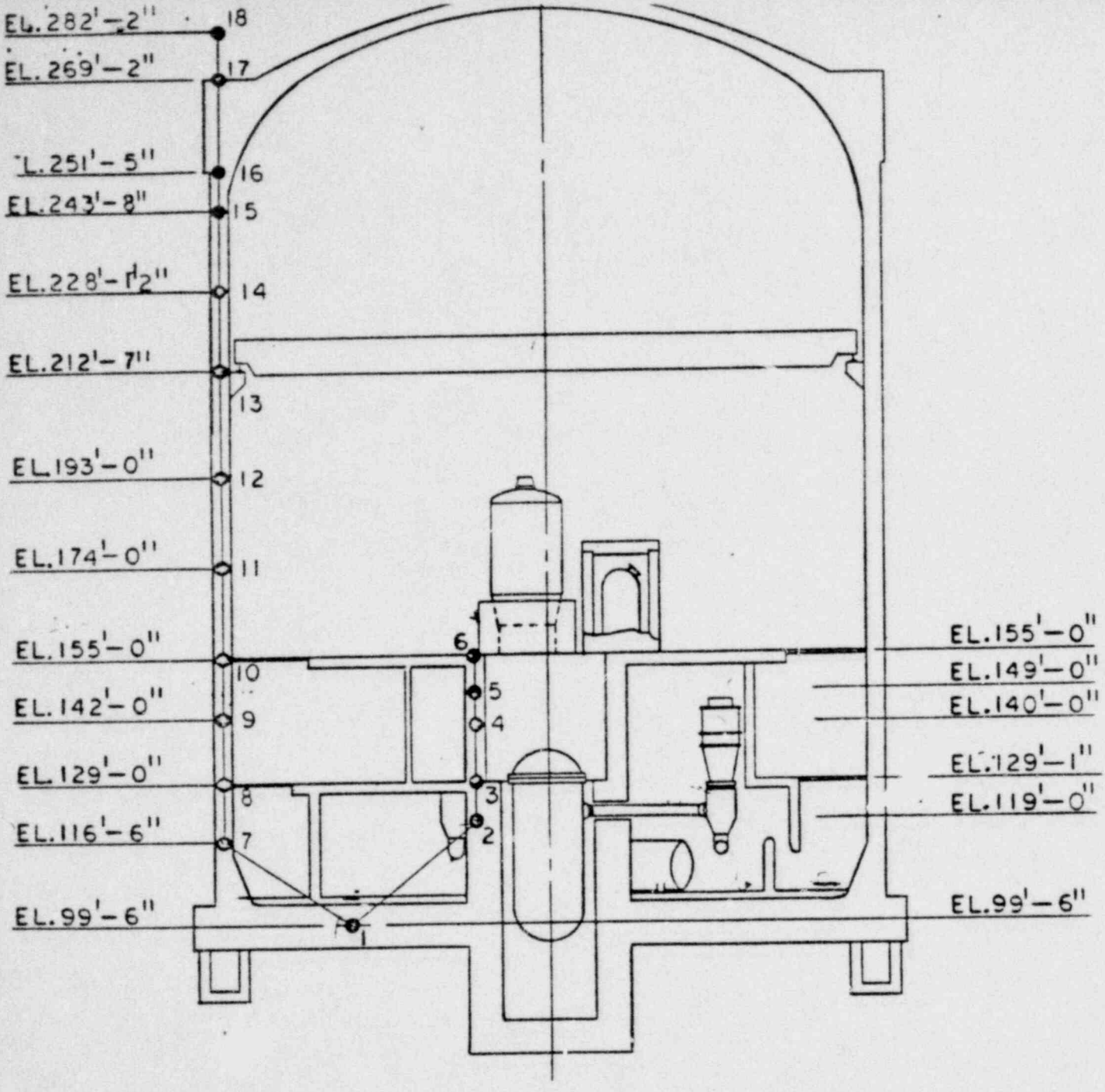
STRUCTURE

Joseph M. Farley Nuclear Plant
Units 1 & 2

Job No. 7597 - 03/20

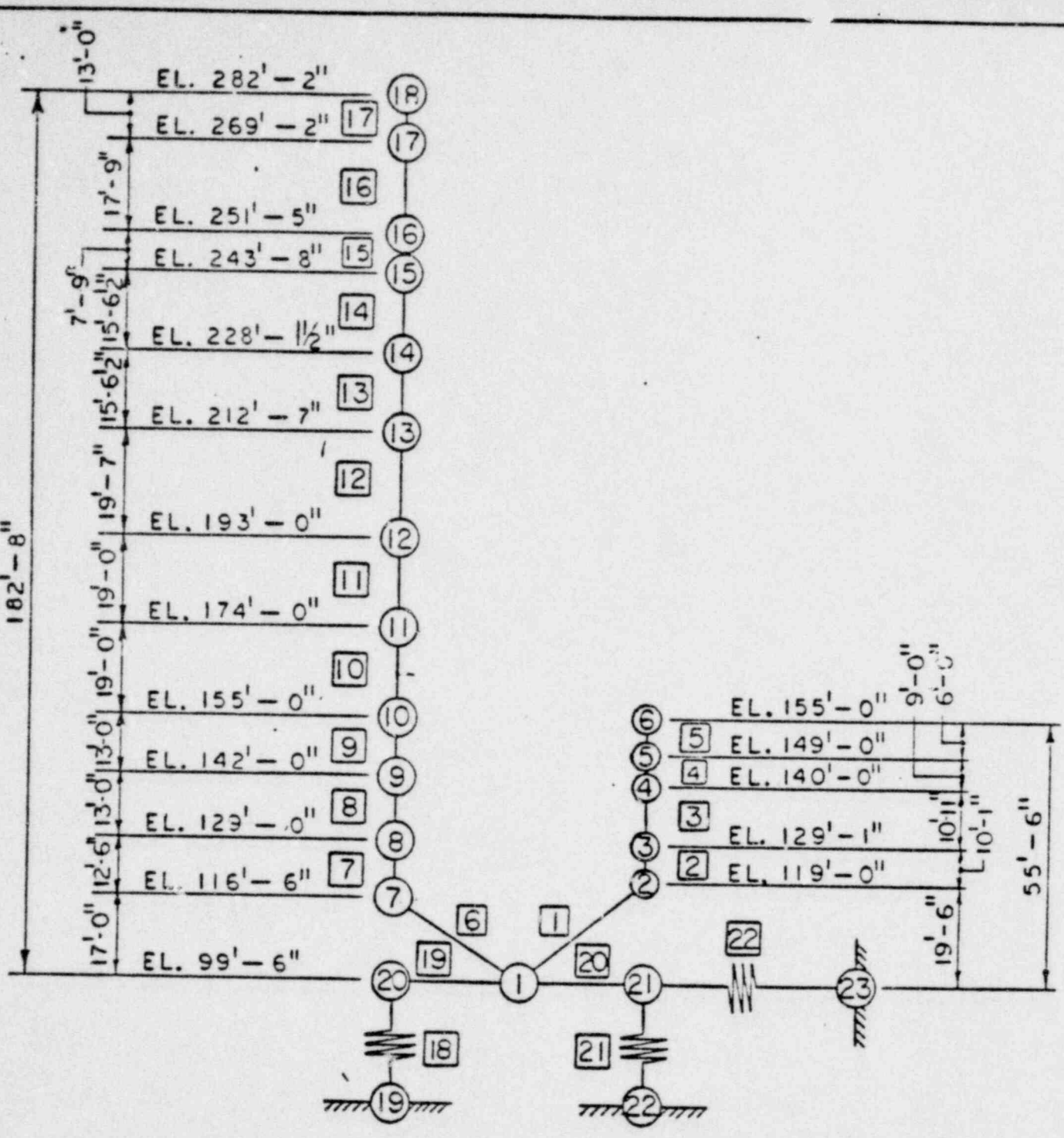
December 1972

Civil Engineering Department
Power & Industrial Division
Bechtel Corporation
Gaithersburg, Maryland



CONTAINMENT & INTERNAL STRUCTURE MASS MODEL

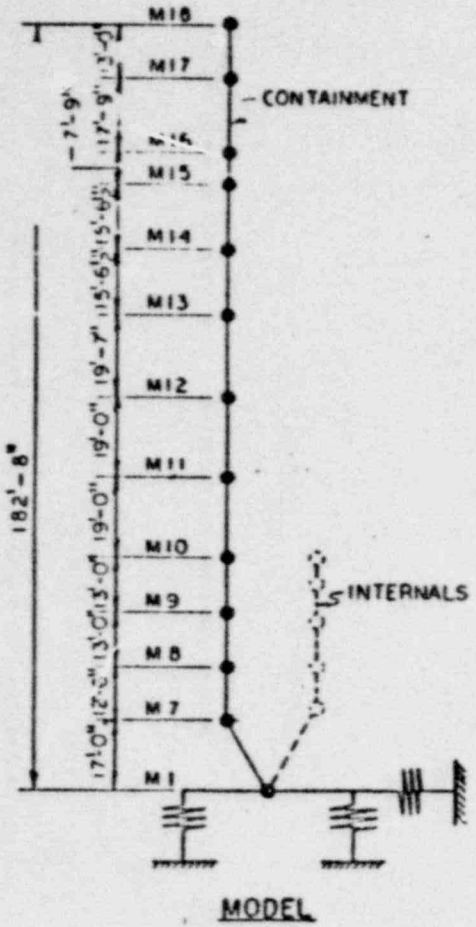
NORTH – SOUTH & EAST – WEST



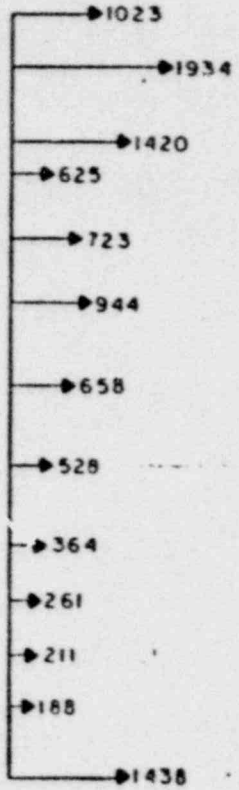
MATHEMATICAL MASS MODEL OF CONTAINMENT AND INTERNAL STRUCTURE

NORTH - SOUTH & EAST - WEST

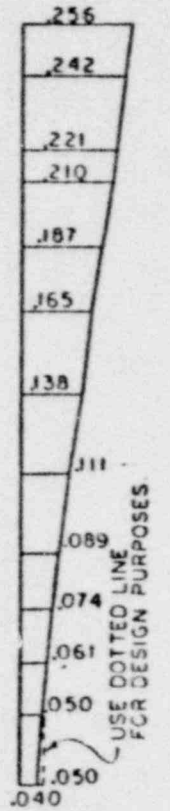
E = 680,000 KSF
G = 272,000 KSF



MODEL

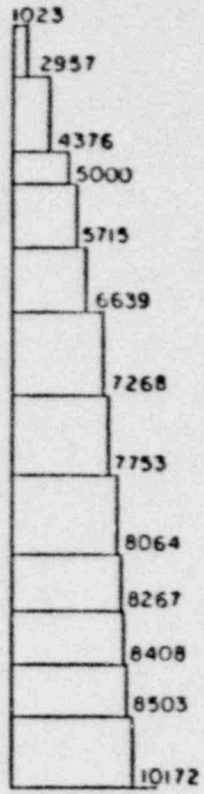


INERTIA FORCE ENVELOPE (KIPS)

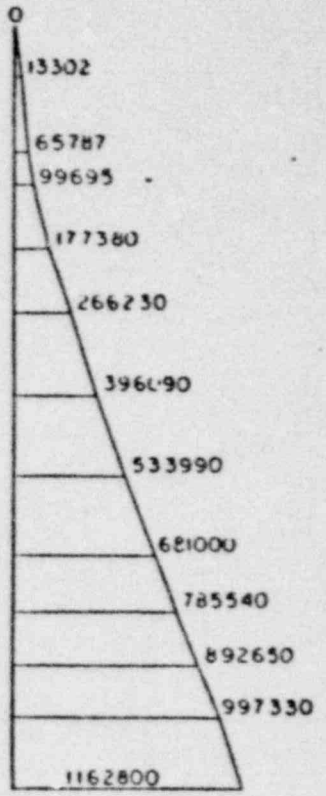


ACCELERATION ENVELOPE (FACTORED G)

DISPLACEMENT ENVELOPE (IN.)



SHEAR ENVELOPE (KIPS)

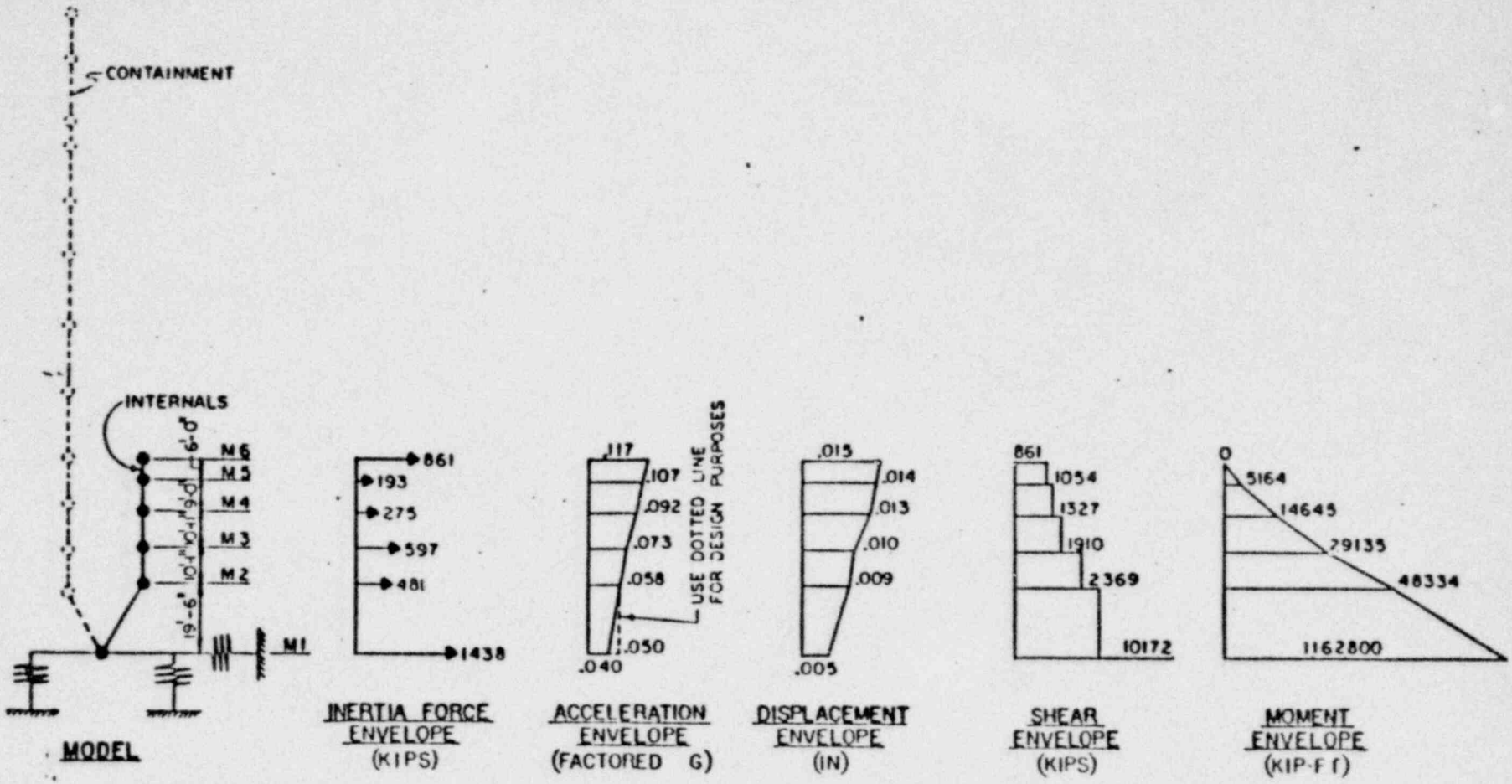


MOMENT ENVELOPE (KIP-FT)

CONTAINMENT STRUCTURE — SEISMIC MODEL RESULTS

NORTH — SOUTH DIRECTION
OPERATING BASIS EARTHQUAKE

E = 680,000 KSF
G = 272,000 KSF

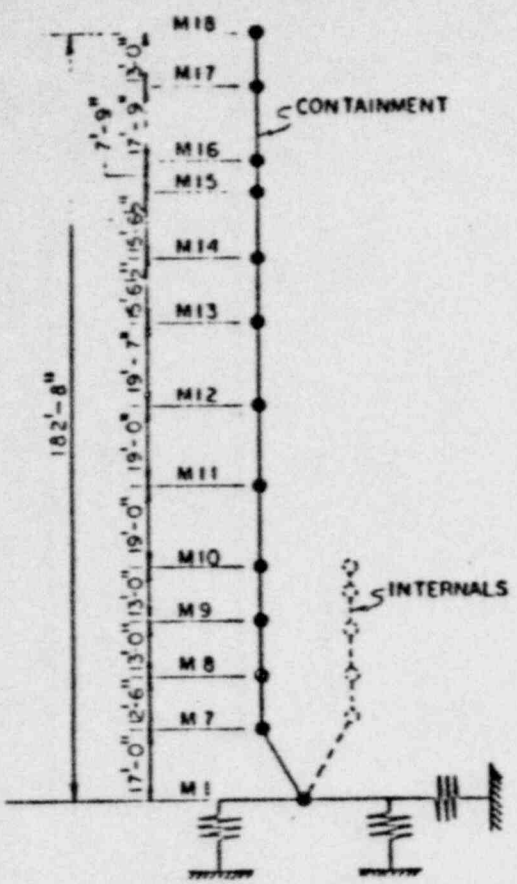


INTERNAL STRUCTURE — SEISMIC MODEL RESULTS

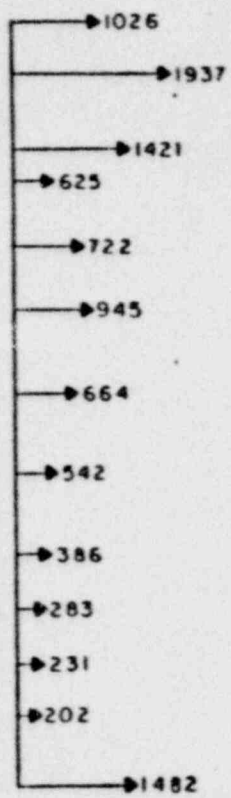
NORTH – SOUTH DIRECTION

OPERATING BASIS EARTHQUAKE

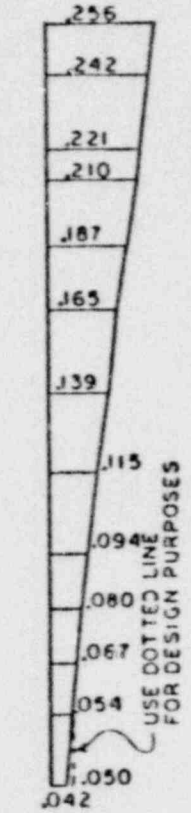
E = 680.000 KSF
G = 272.000 KSF



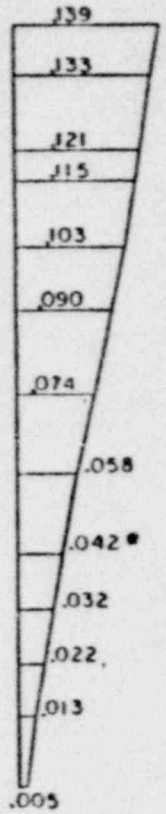
MODEL



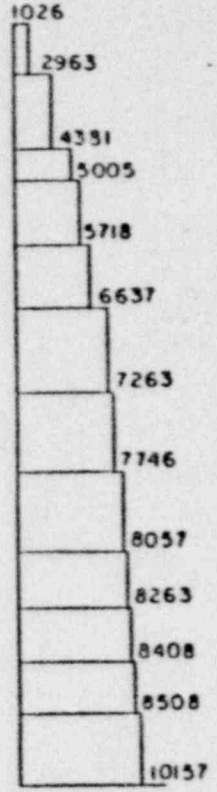
INERTIA FORCE ENVELOPE (KIPS)



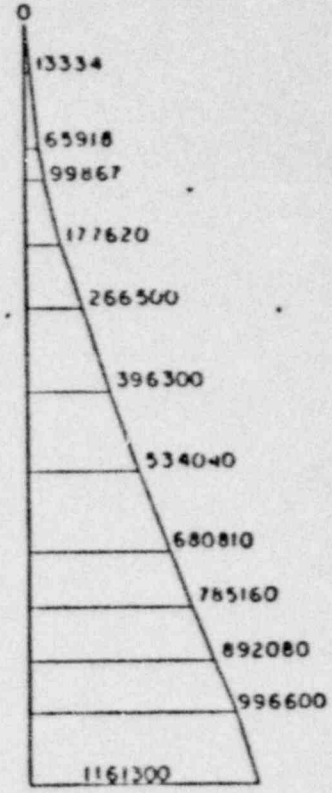
ACCELERATION ENVELOPE (FACTORED G)



DISPLACEMENT ENVELOPE (IN)



SHEAR ENVELOPE (KIPS)

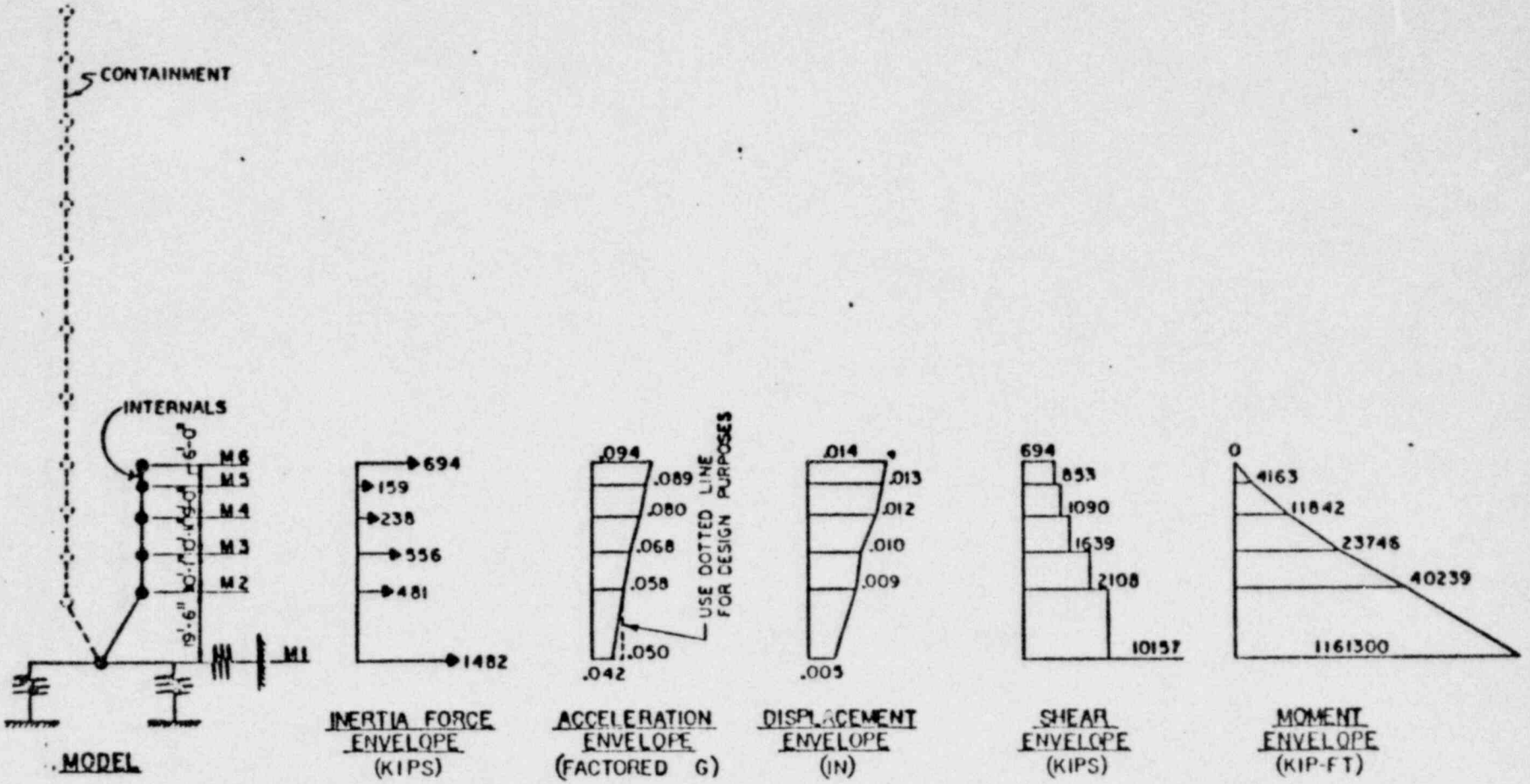


MOMENT ENVELOPE (KIP-FT)

CONTAINMENT STRUCTURE — SEISMIC MODEL RESULTS

EAST — WEST DIRECTION
OPERATING BASIS EARTHQUAKE

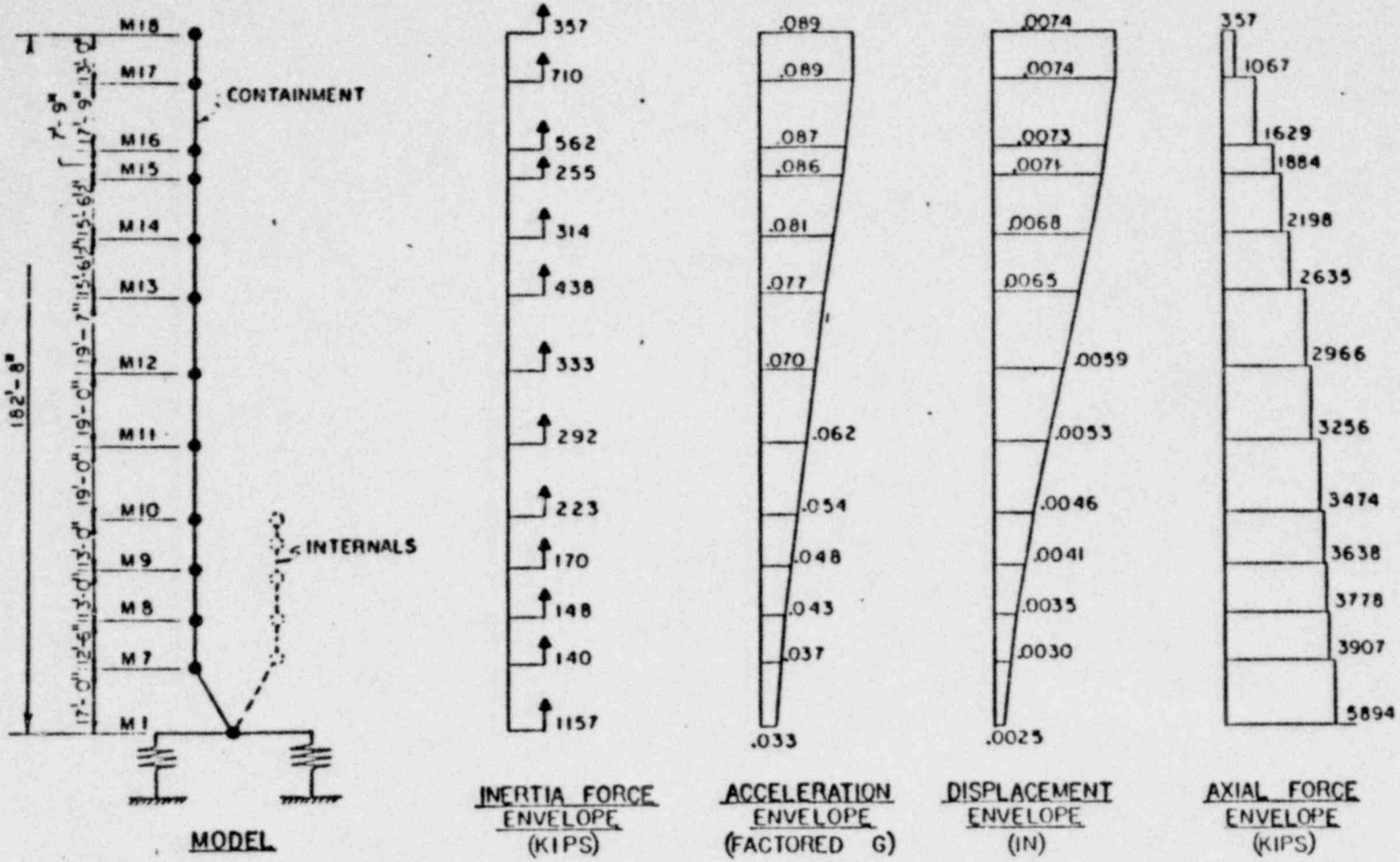
E = 680,000 KSF
G = 272,000 KSF



INTERNAL STRUCTURE — SEISMIC MODEL RESULTS

EAST – WEST DIRECTION
OPERATING BASIS EARTHQUAKE

E = 680,000 KSF
G = 272,000 KSF



MODEL

INERTIA FORCE ENVELOPE (KIPS)

ACCELERATION ENVELOPE (FACTORED G)

DISPLACEMENT ENVELOPE (IN)

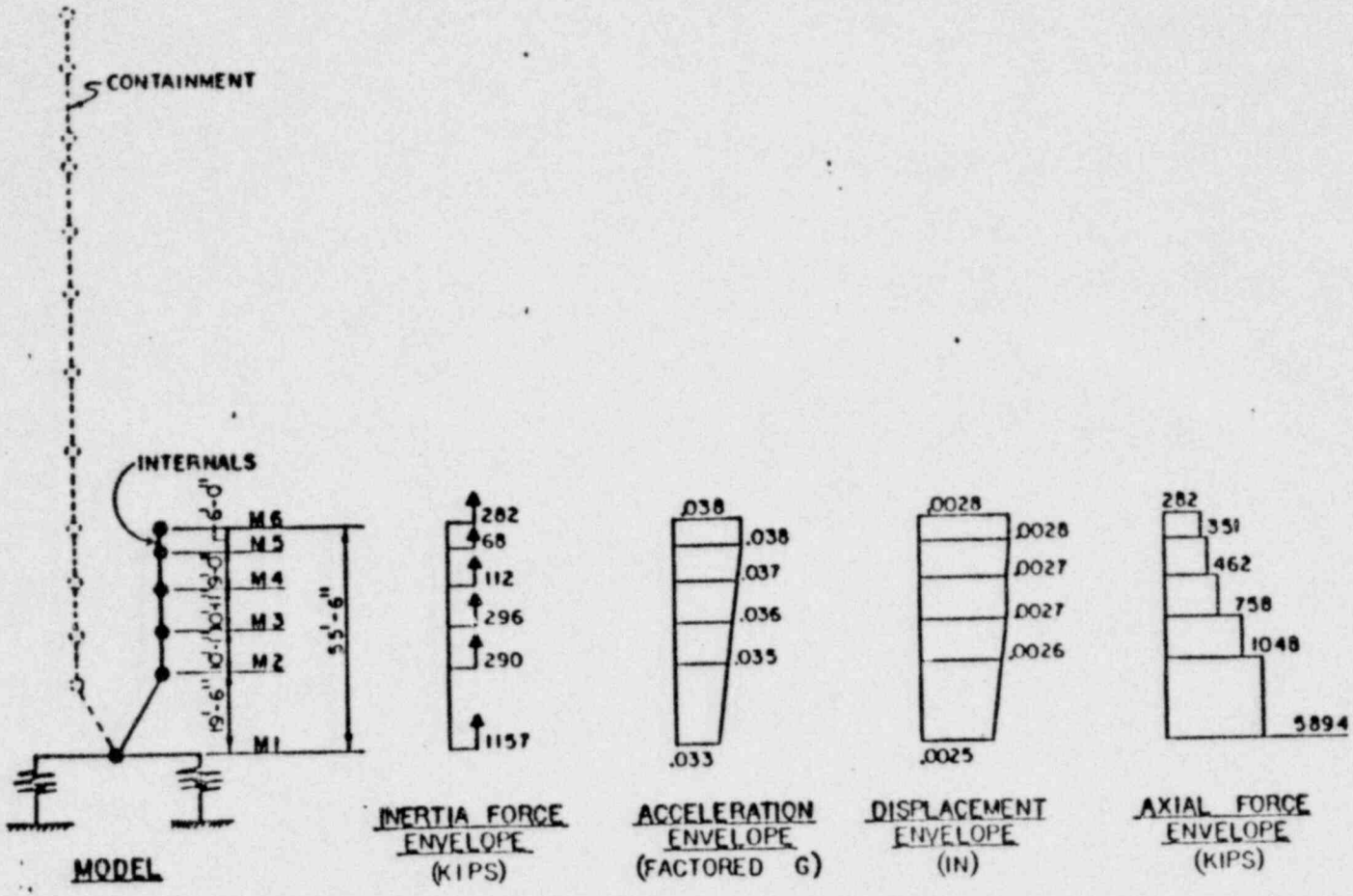
AXIAL FORCE ENVELOPE (KIPS)

CONTAINMENT STRUCTURE — SEISMIC MODEL RESULTS

VERTICAL DIRECTION

OPERATING BASIS EARTHQUAKE

E = 680,000 KSF
G = 272,000 KSF



MODEL

INERTIA FORCE ENVELOPE (KIPS)

ACCELERATION ENVELOPE (FACTORED G)

DISPLACEMENT ENVELOPE (IN)

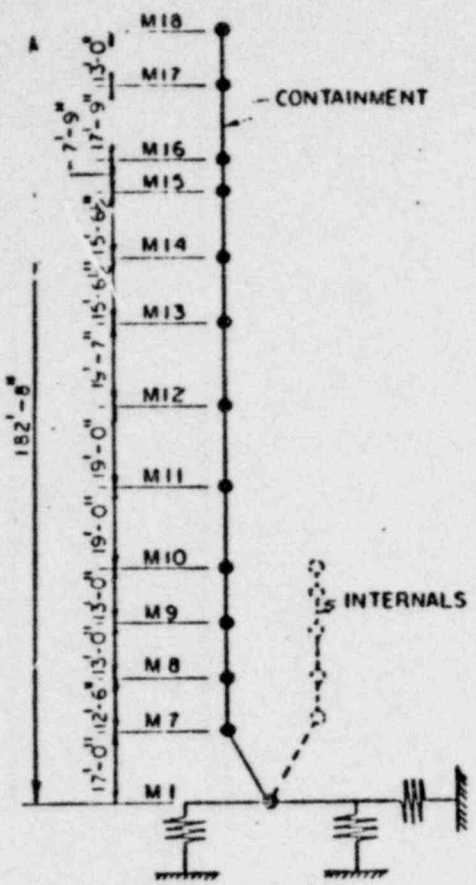
AXIAL FORCE ENVELOPE (KIPS)

INTERNAL STRUCTURE — SEISMIC MODEL RESULTS

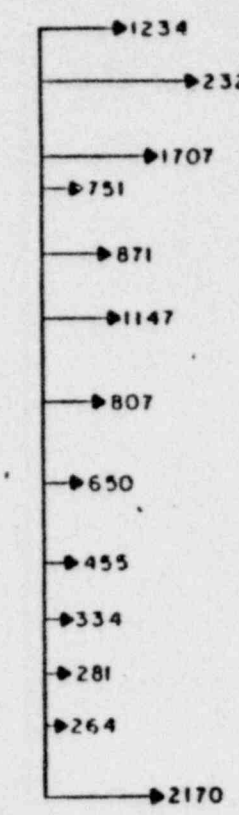
VERTICAL DIRECTION

OPERATING BASIS EARTHQUAKE

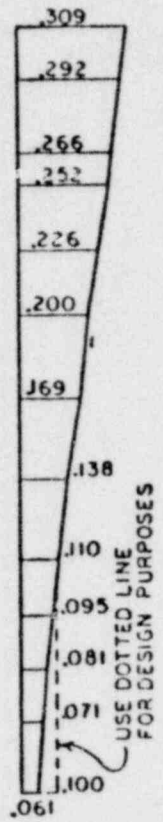
E = 680,000 KSF
G = 272,000 KSF



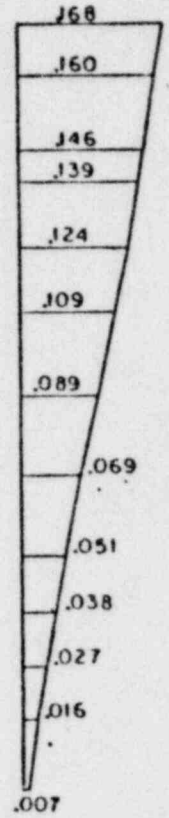
MODEL



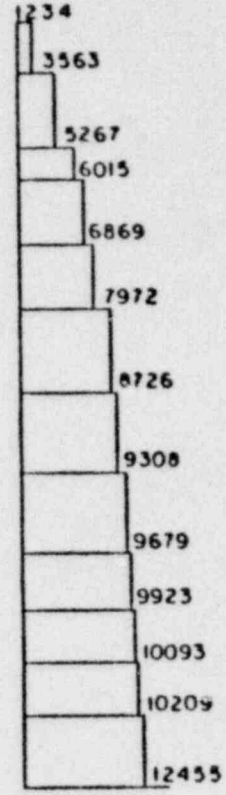
INERTIA FORCE ENVELOPE (KIPS)



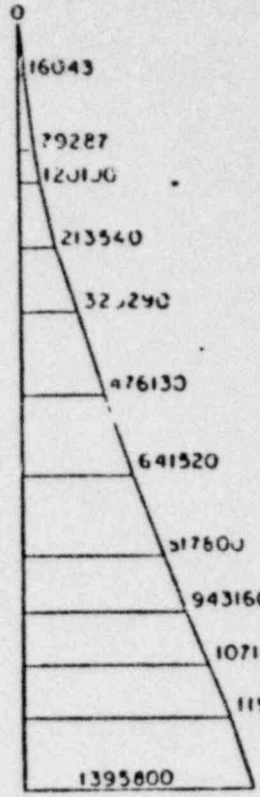
ACCELERATION ENVELOPE (FACTORED G)



DISPLACEMENT ENVELOPE (IN)



SHEAR ENVELOPE (KIPS)



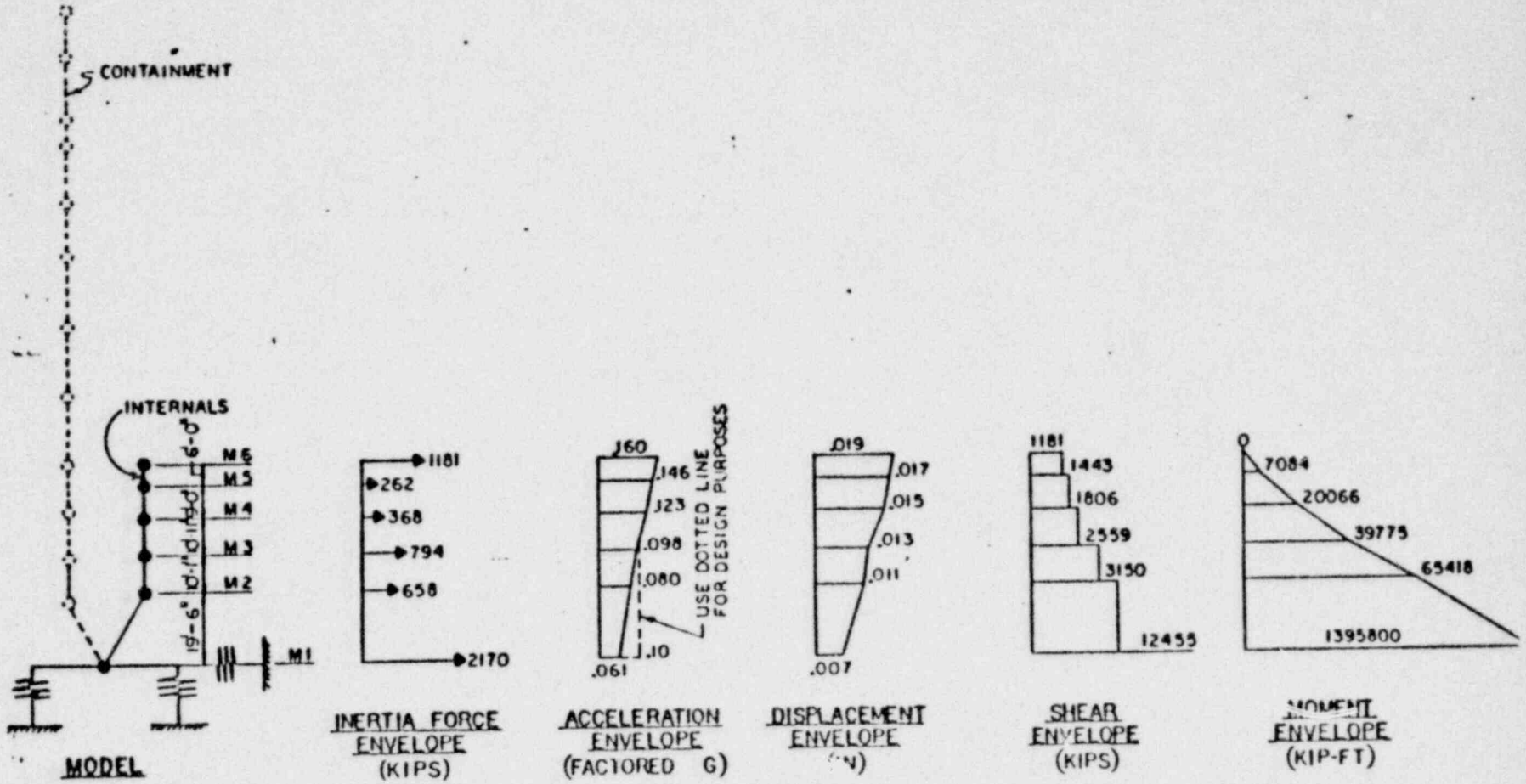
MOMENT ENVELOPE (KIP-FT)

CONTAINMENT STRUCTURE — SEISMIC MODEL RESULTS

NORTH - SOUTH DIRECTION

SAFE SHUTDOWN EARTHQUAKE

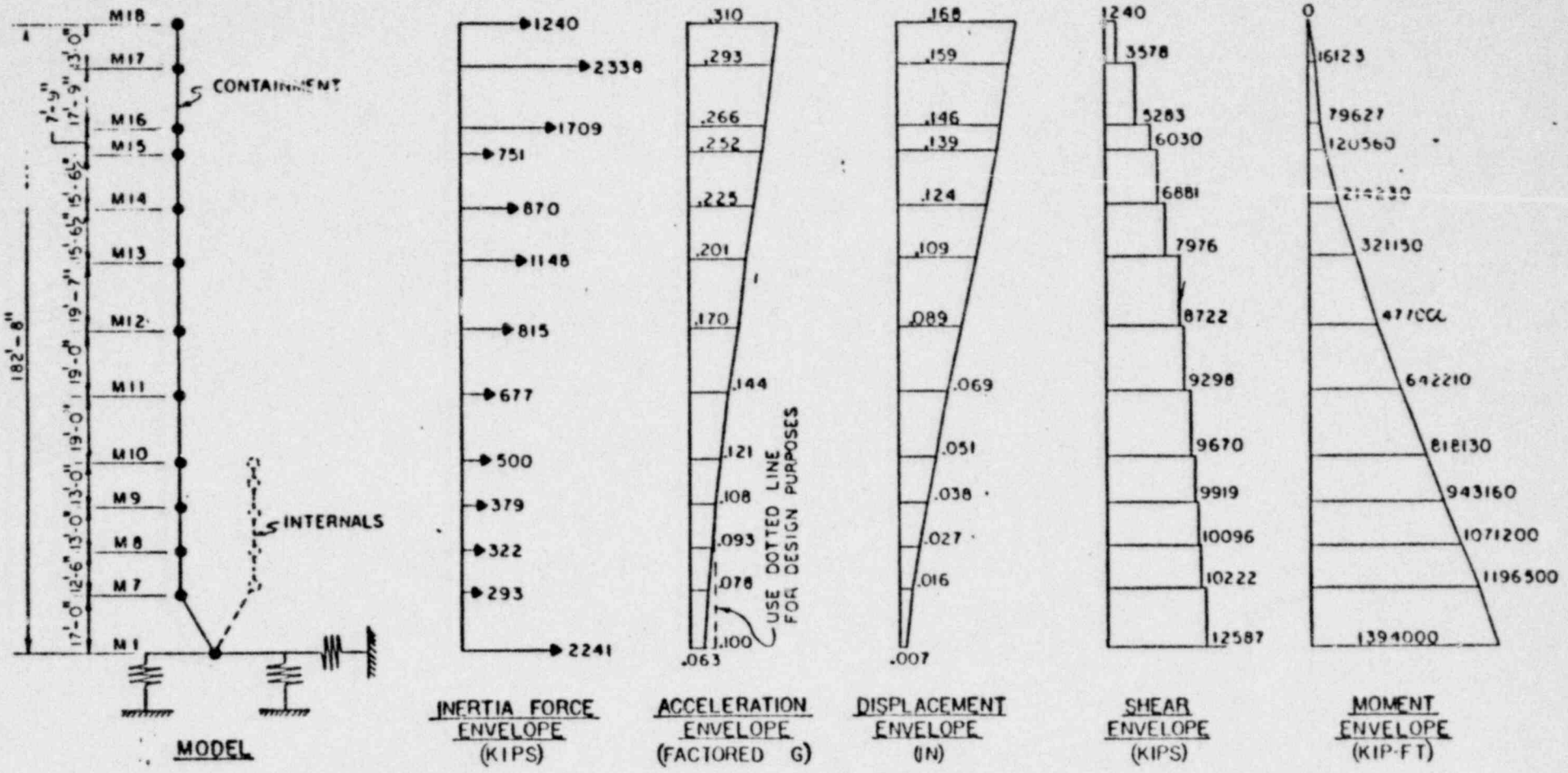
E = 680,000 KSF
G = 272,000 KSF



INTERNAL STRUCTURE — SEISMIC MODEL RESULTS

NORTH — SOUTH DIRECTION
SAFE SHUTDOWN EARTHQUAKE

E = 680,000 KSF
G = 272,000 KSF



MODEL

INERTIA FORCE ENVELOPE (KIPS)

ACCELERATION ENVELOPE (FACTORED G)

DISPLACEMENT ENVELOPE (IN)

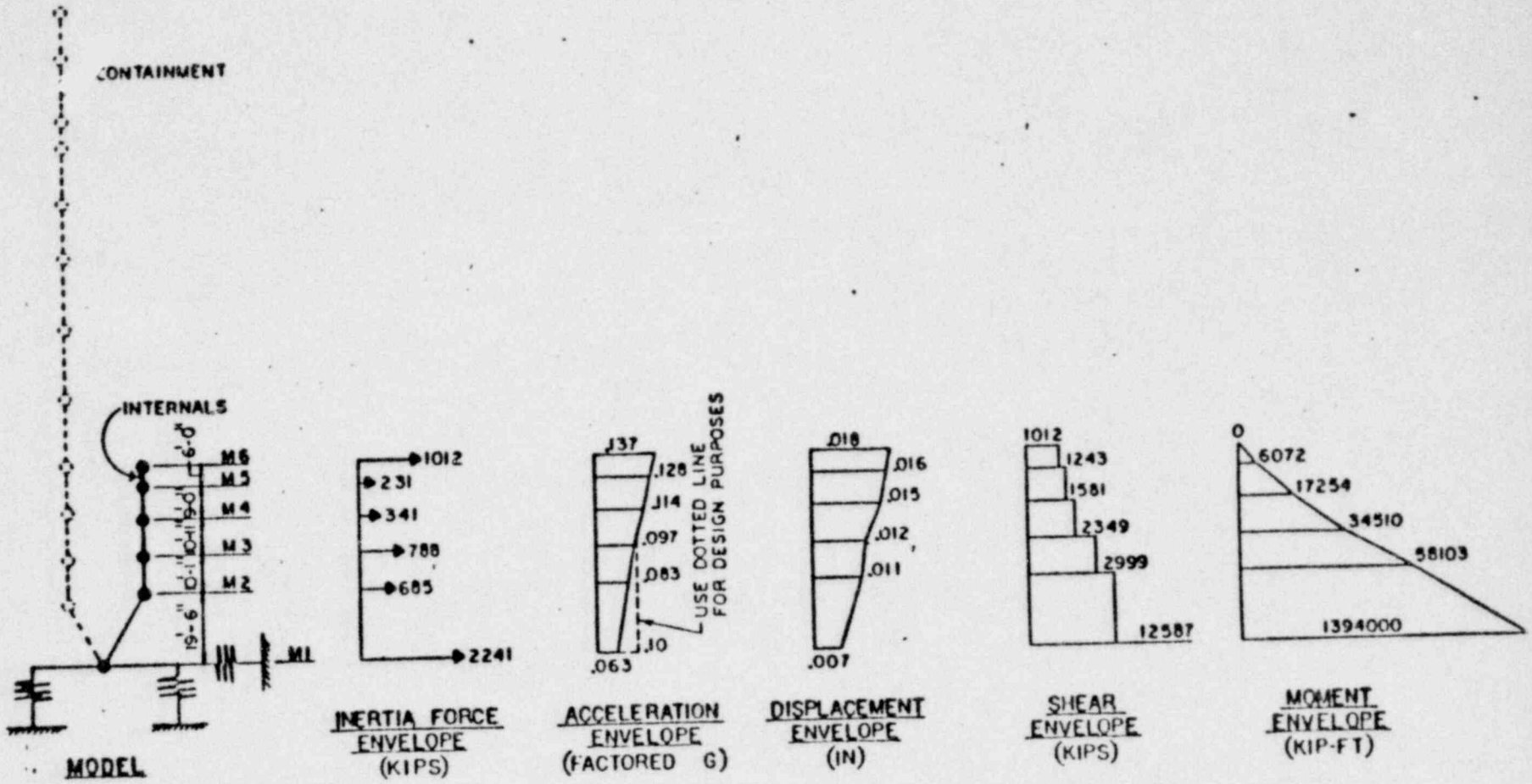
SHEAR ENVELOPE (KIPS)

MOMENT ENVELOPE (KIP-FT)

CONTAINMENT STRUCTURE — SEISMIC MODEL RESULTS

EAST–WEST DIRECTION
SAFE SHUTDOWN EARTHQUAKE

E = 680,000 KSF
G = 272,000 KSF

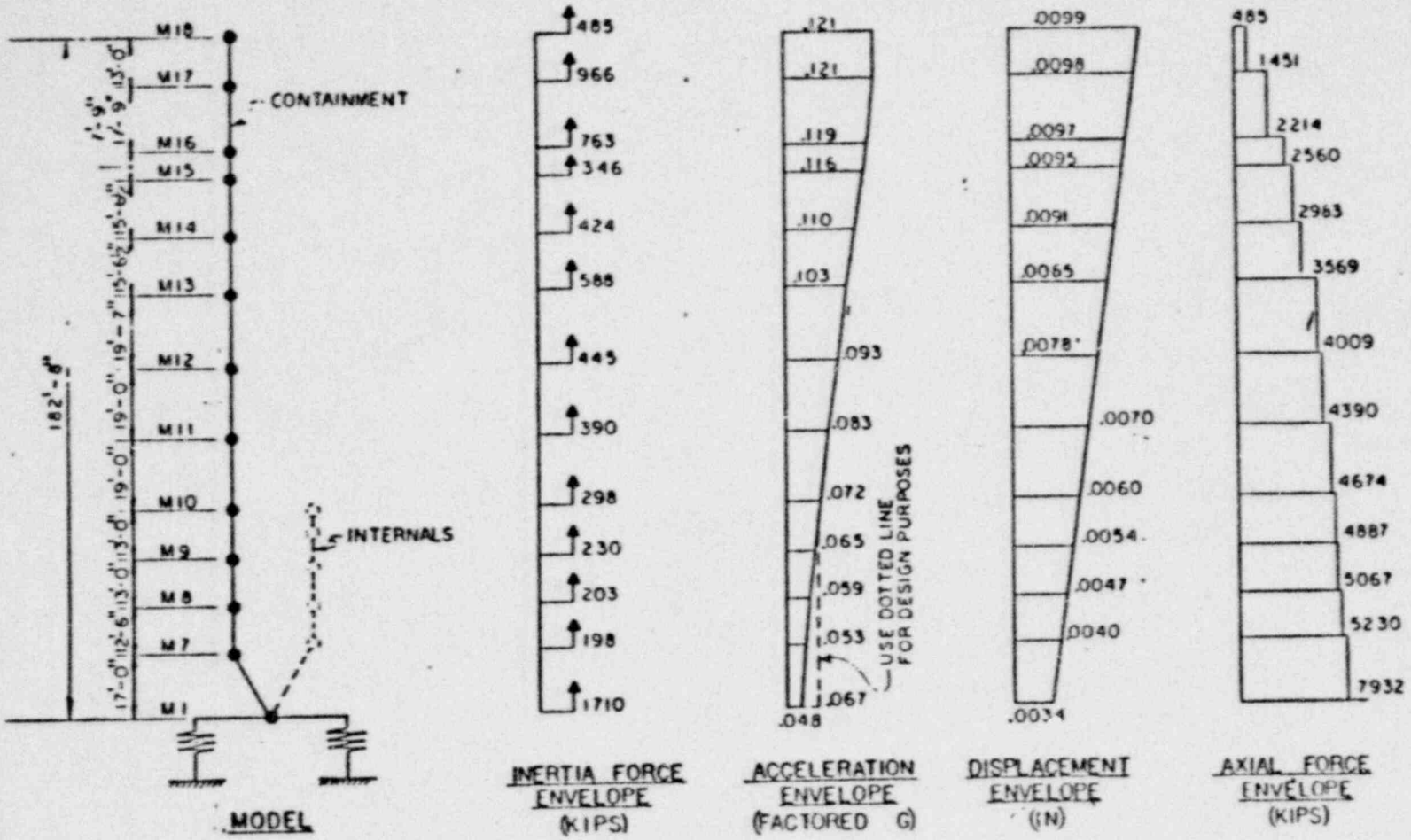


INTERNAL STRUCTURE — SEISMIC MODEL RESULTS

EAST – WEST DIRECTION

SAFE SHUTDOWN EARTHQUAKE

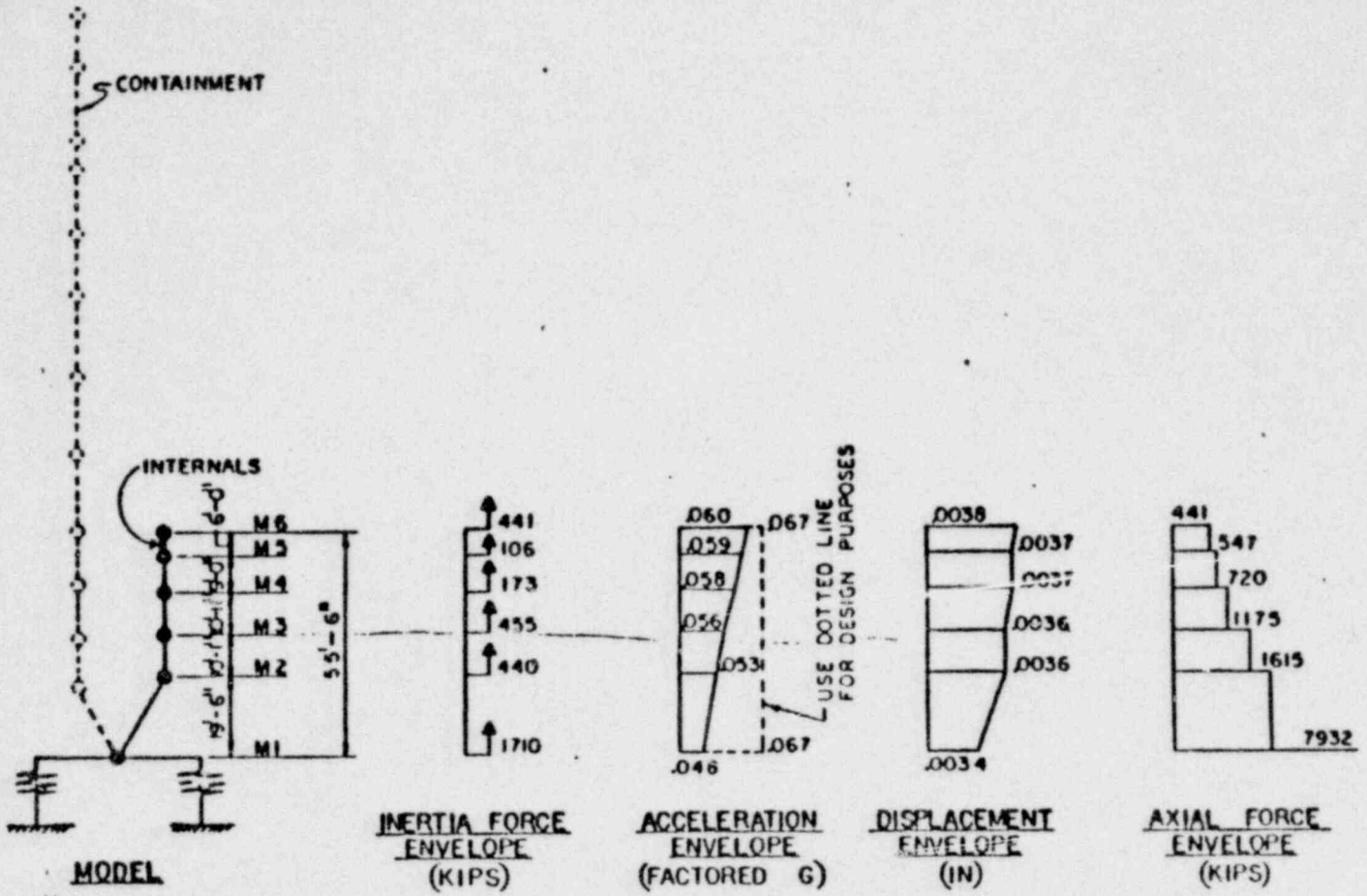
E = 680,000 KSF
G = 272,000 KSF



CONTAINMENT STRUCTURE — SEISMIC MODEL RESULTS

VERTICAL DIRECTION
SAFE SHUTDOWN EARTHQUAKE

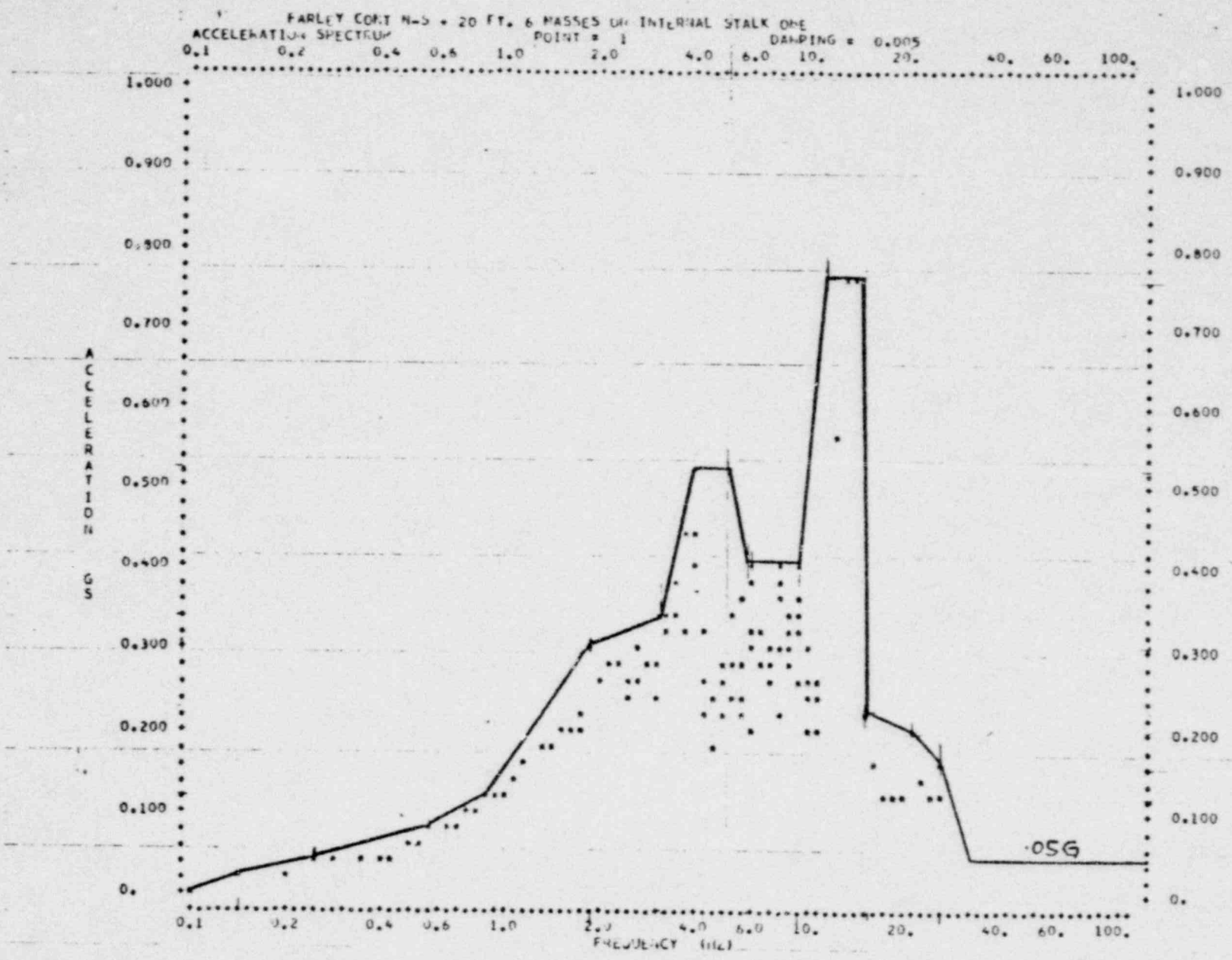
E = 680,000 KSF
G = 272,000 KSF

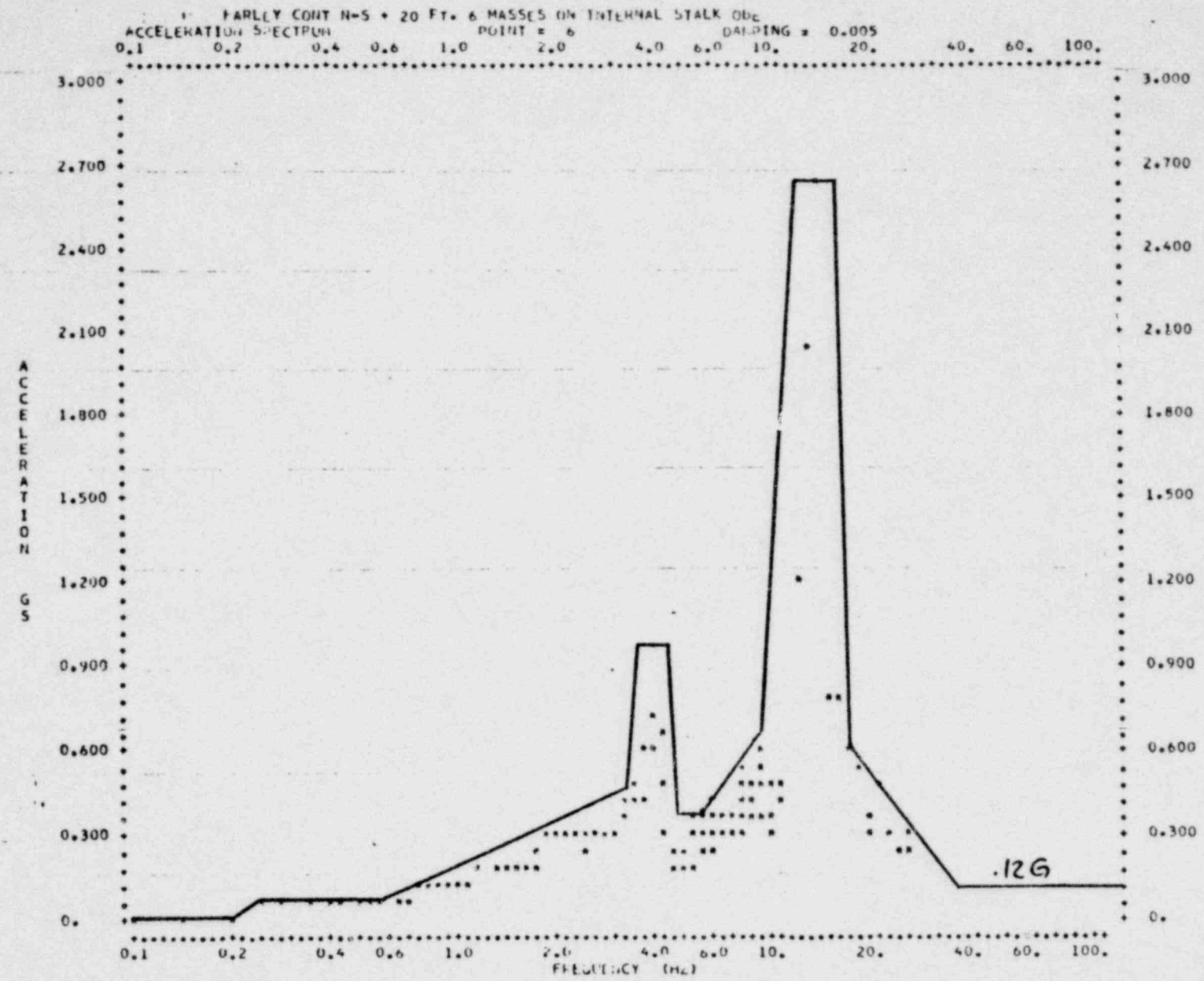


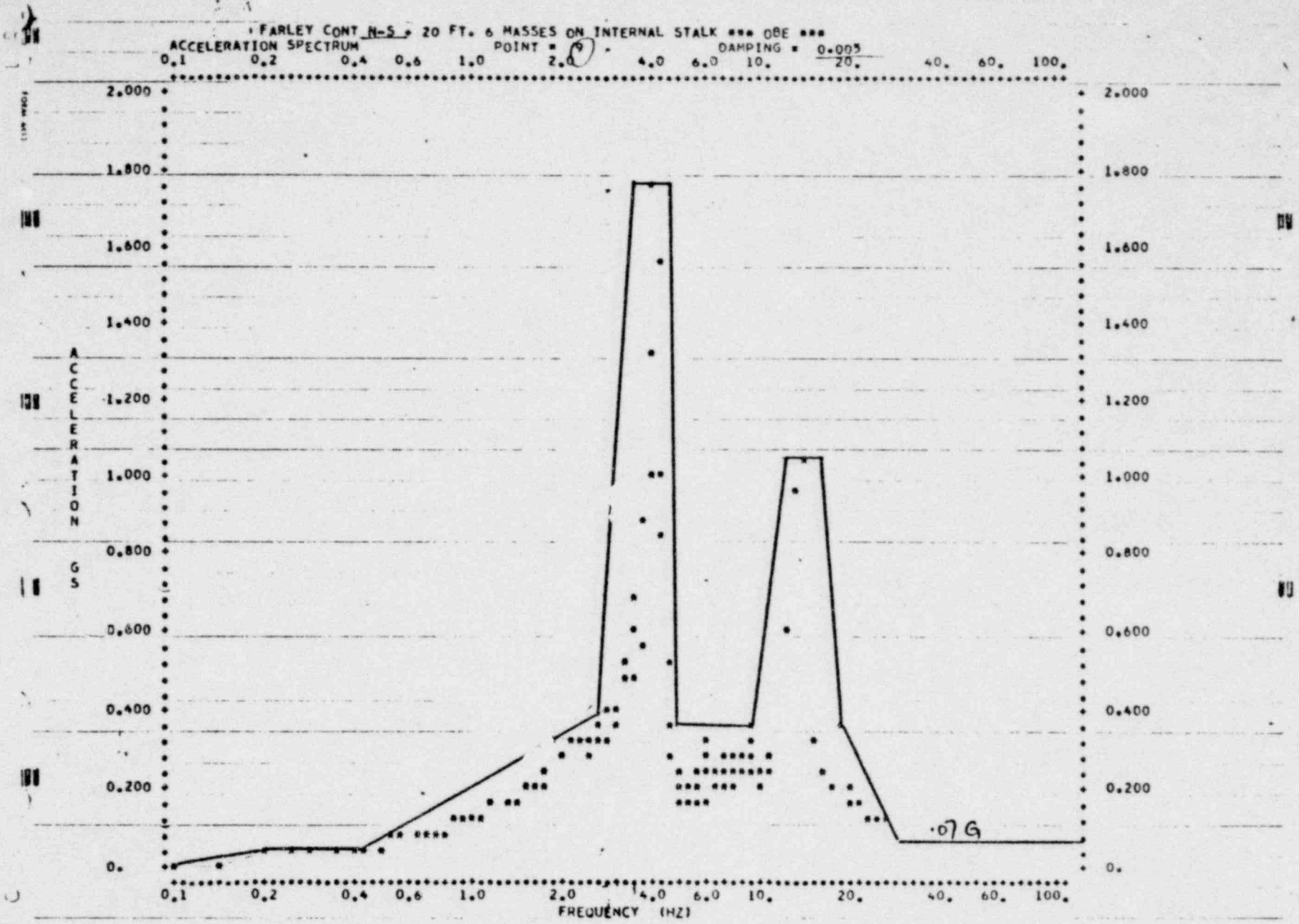
INTERNAL STRUCTURE — SEISMIC MODEL RESULTS

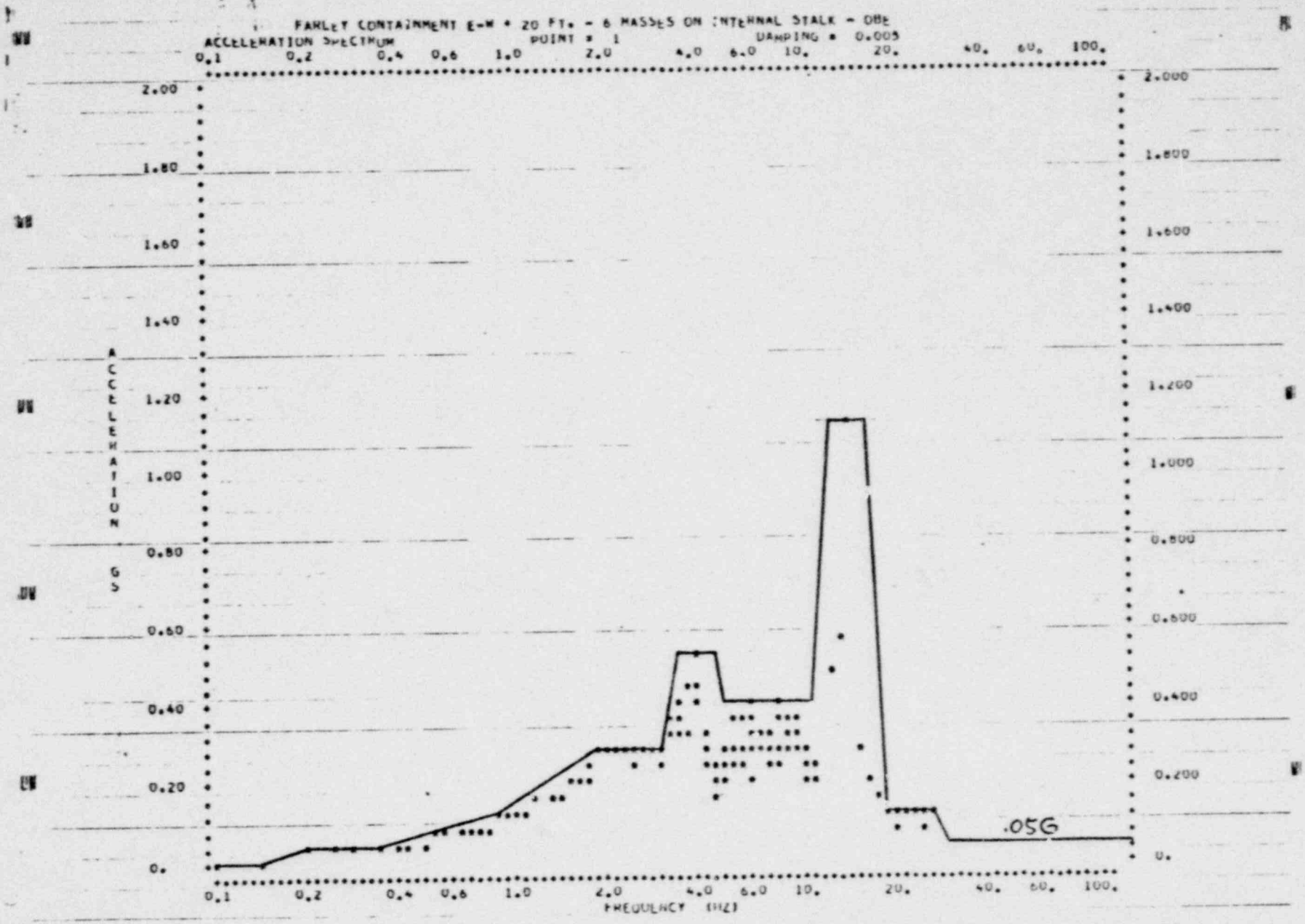
VERTICAL DIRECTION

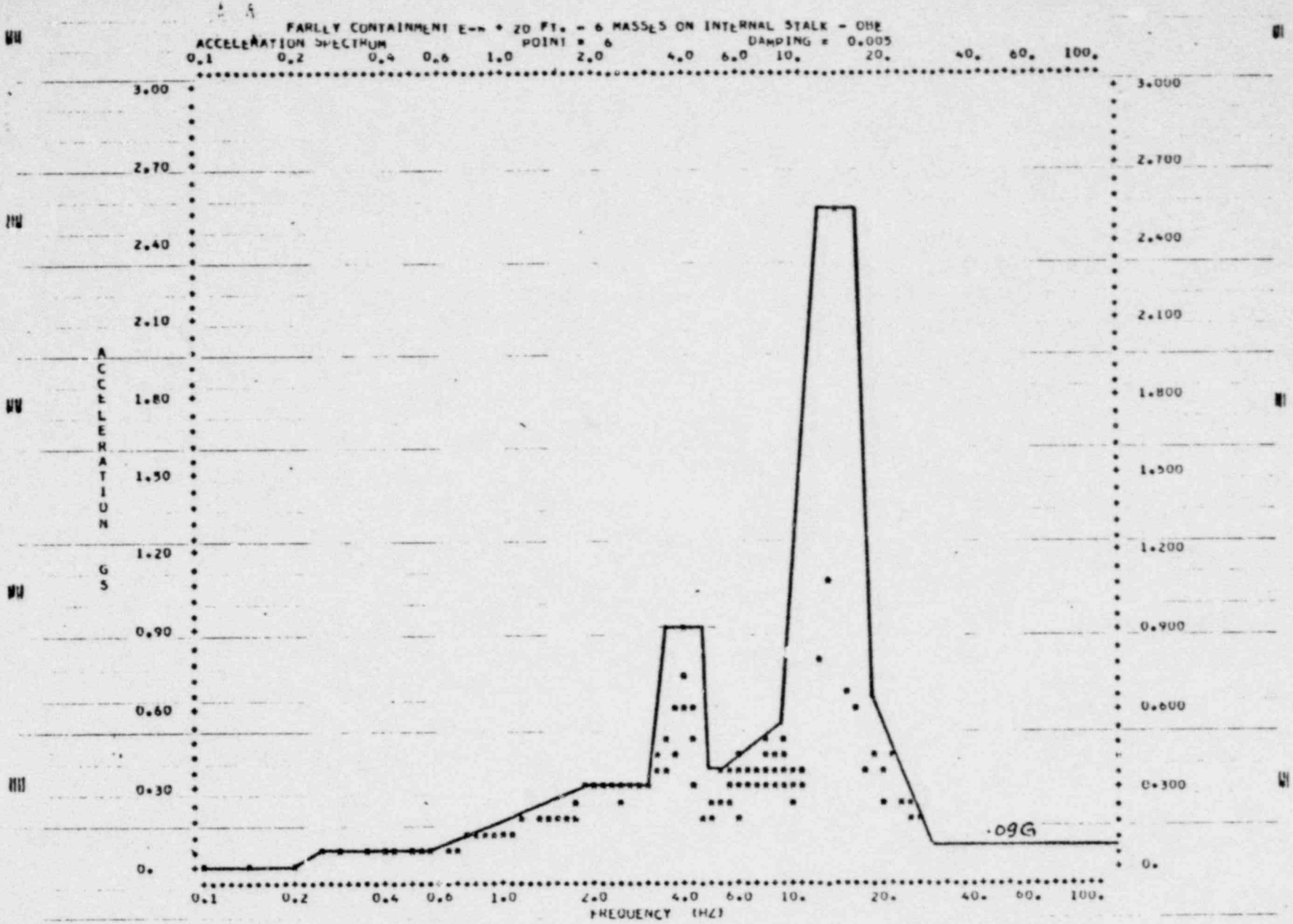
SAFE SHUTDOWN EARTHQUAKE

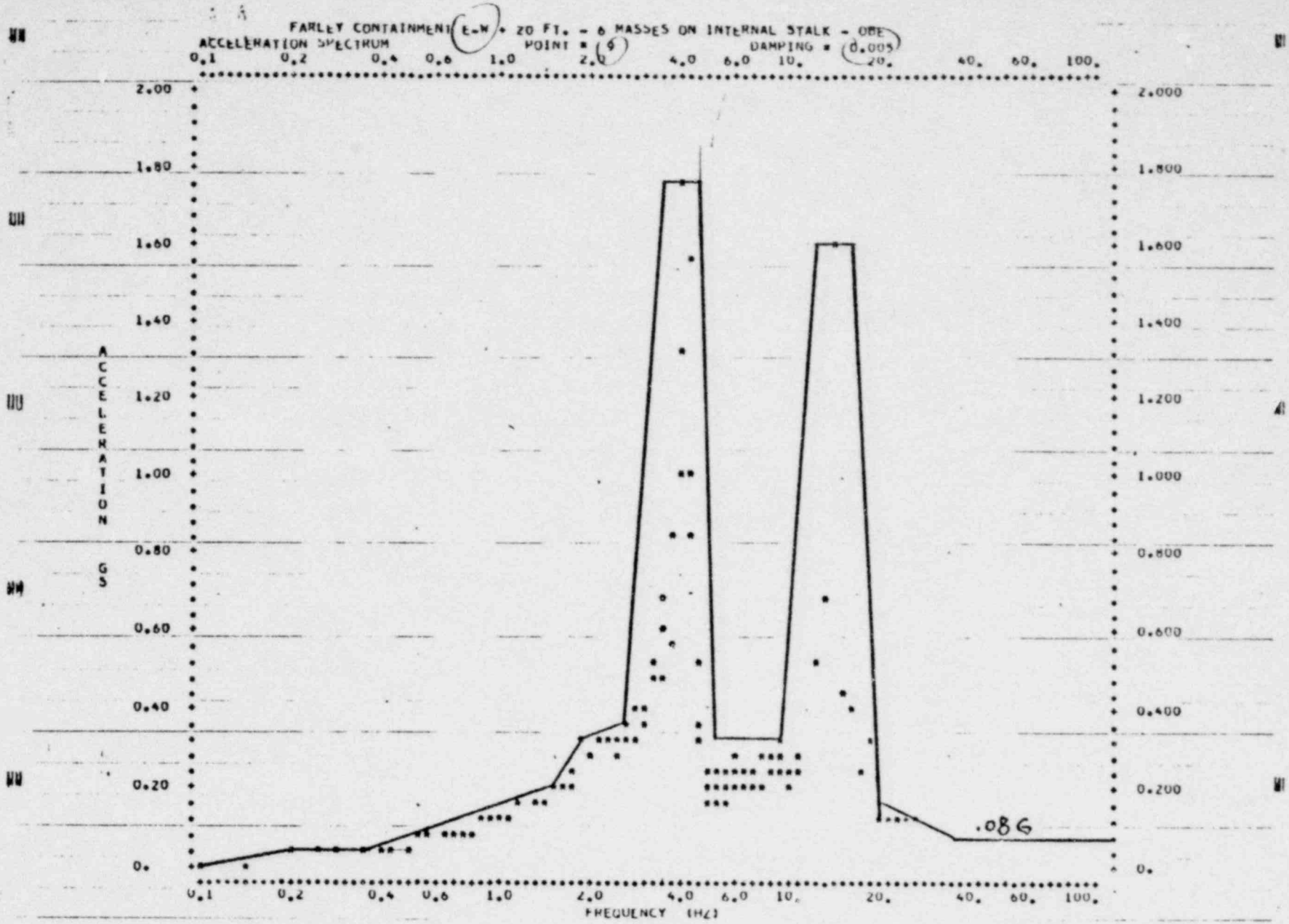

FARLEY CONT N-S + 20 FT. 6 MASSES ON INTERNAL STALK ONE
ACCELERATION SPECTRUM
POINT = 1
DAMPING = 0.005
0.1
0.2
0.4
0.6
1.0
2.0
4.0
6.0
10.
20.
40.
60.
100.
1.000
0.900
0.800
0.700
0.600
0.500
0.400
0.300
0.200
0.100
0.
ACCELERATION GS
FREQUENCY (HZ)
.05G

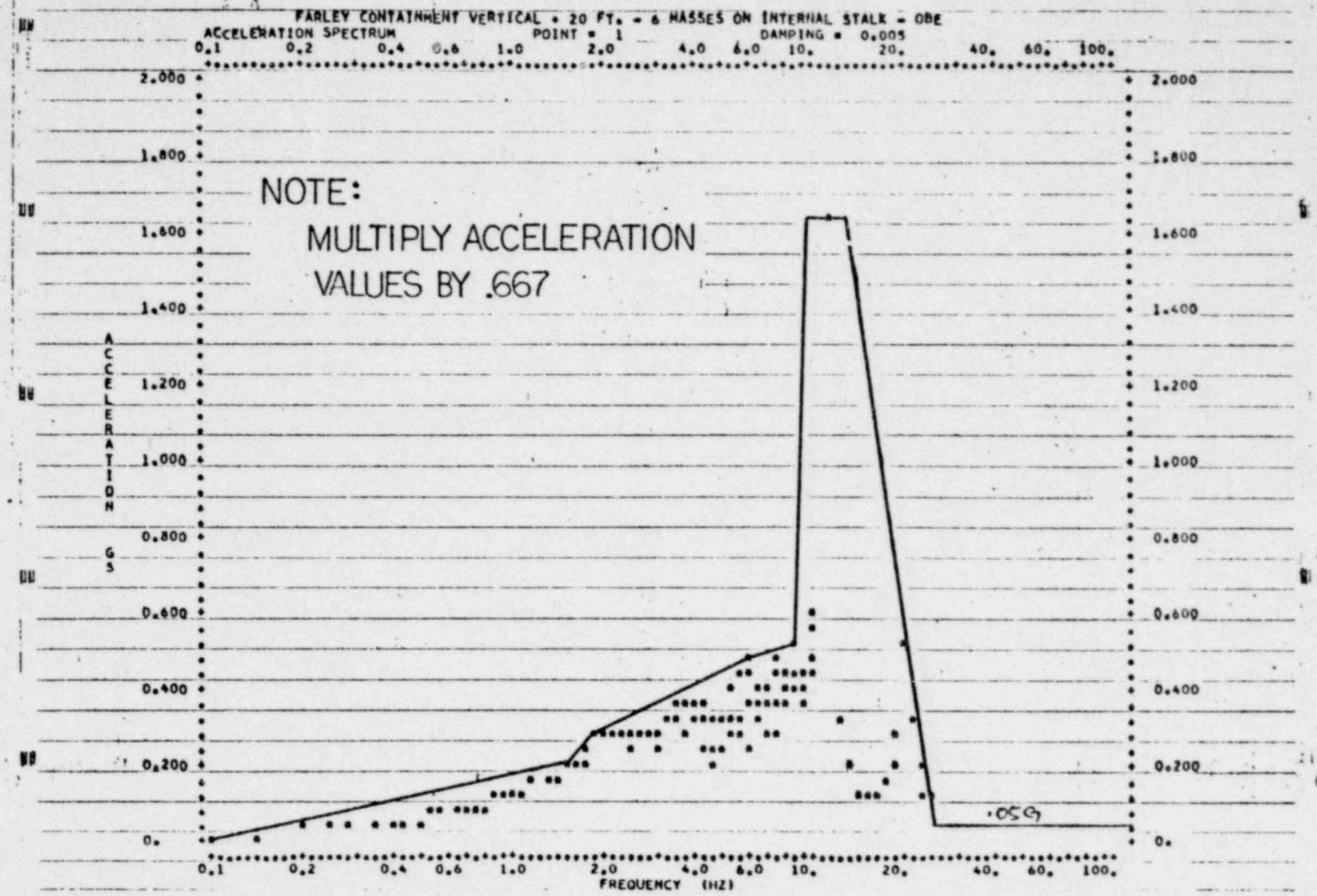

FARLEY CONT N-S + 20 FT. 6 MASSES ON INTERNAL STALK OBE
ACCELERATION SPECTRUM
POINT = 6
DAMPING = 0.005
0.1
0.2
0.4
0.6
1.0
2.0
4.0
6.0
10.
20.
40.
60.
100.
3.000
2.700
2.400
2.100
1.800
1.500
1.200
0.900
0.600
0.300
0.
ACCELERATION GS
FREQUENCY (HZ)
.12G

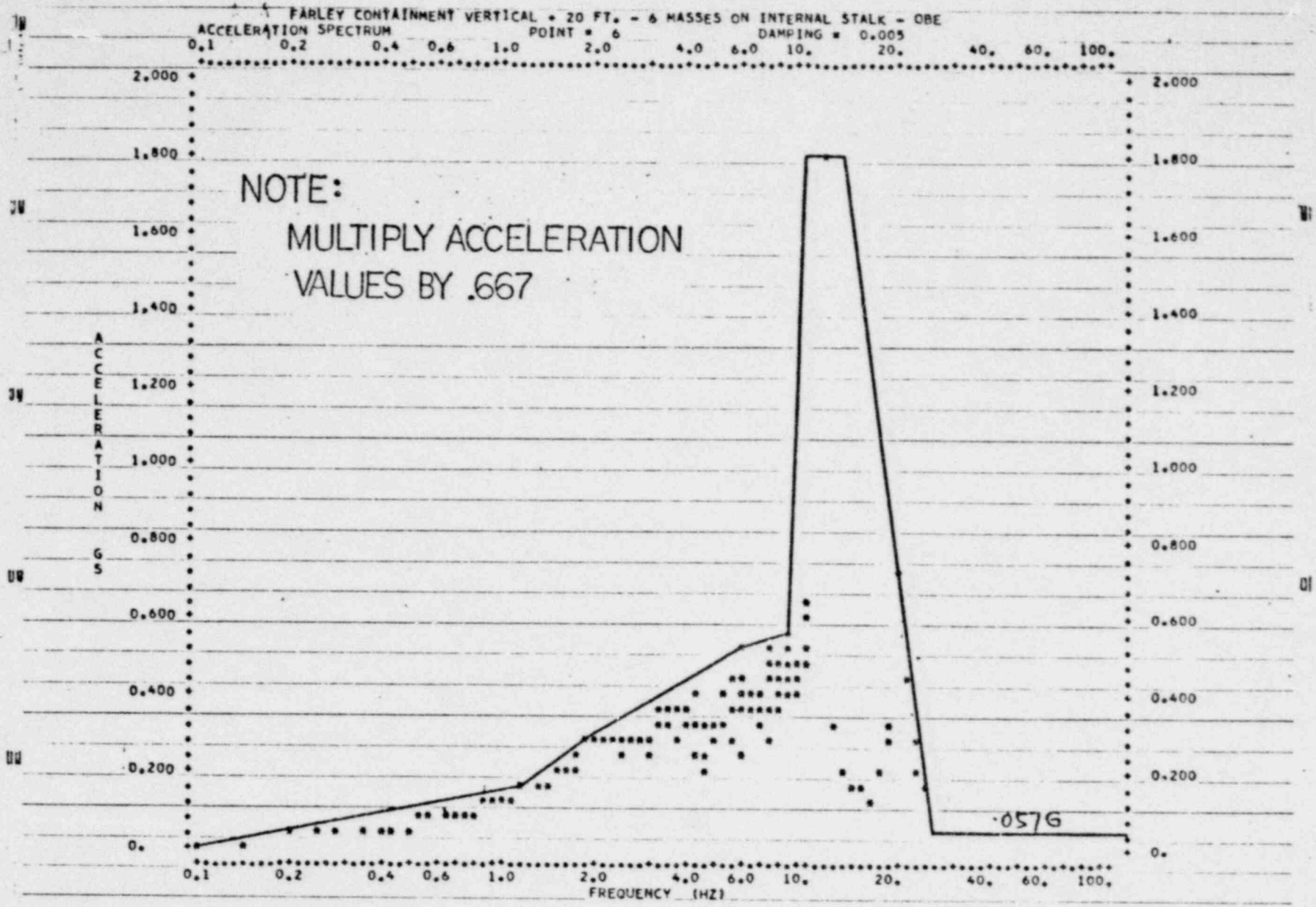

FARLEY CONT N-S , 20 FT. 6 MASSES ON INTERNAL STALK *** OBE ***
ACCELERATION SPECTRUM
POINT = 9 .
DAMPING = 0.005
0.1 0.2 0.4 0.6 1.0 2.0 4.0 6.0 10. 20. 40. 60. 100.
2.000
1.800
1.600
1.400
1.200
1.000
0.800
0.600
0.400
0.200
0.
ACCELERATION GS
.07 G
FREQUENCY (HZ)

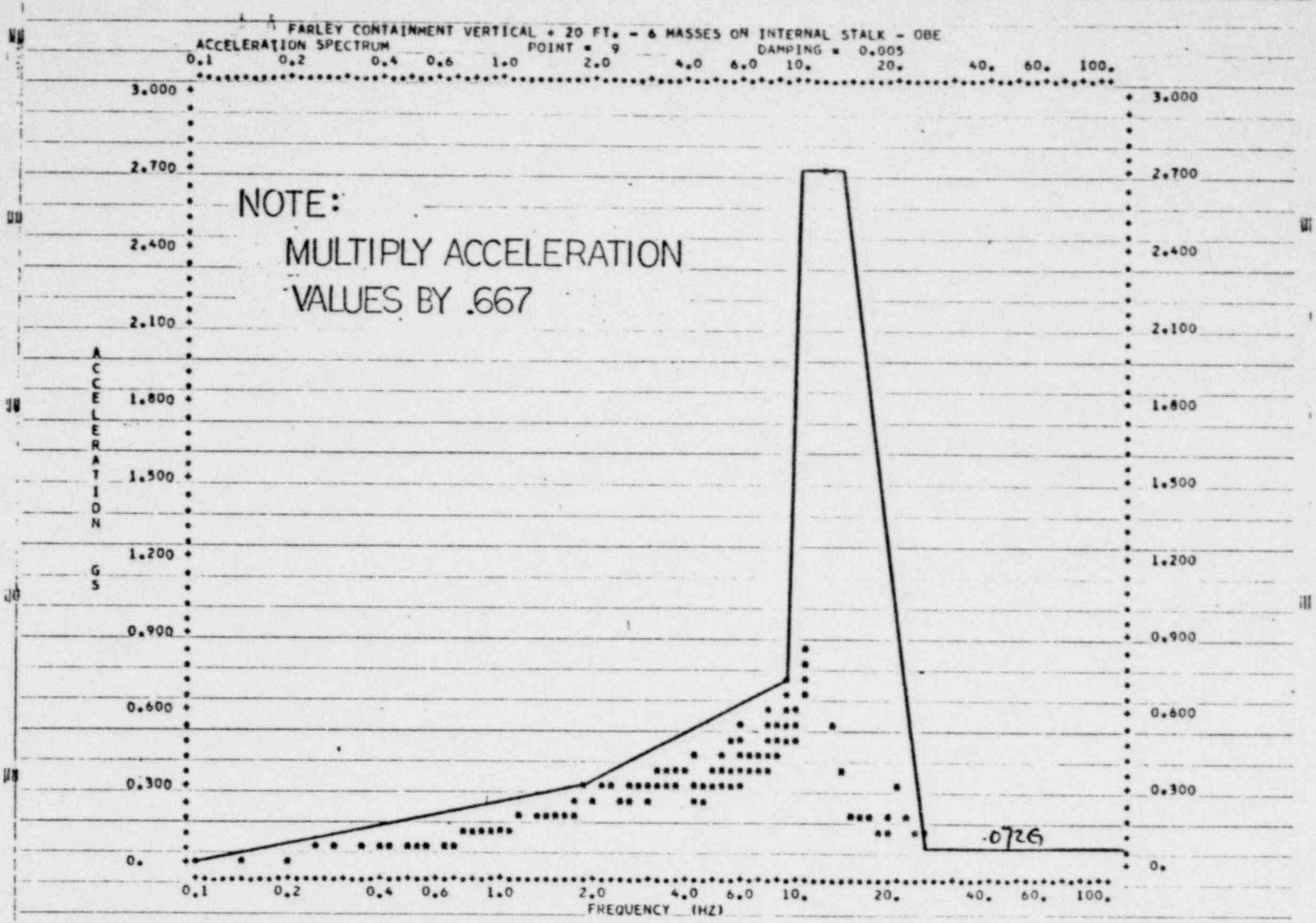

PARLET CONTAINMENT E-W + 20 FT. - 6 MASSES ON INTERNAL STALK - OBE
ACCELERATION SPECTRUM
POINT = 1
DAMPING = 0.005
0.1
0.2
0.4
0.6
1.0
2.0
4.0
6.0
10.
20.
40.
60.
100.
2.00
1.80
1.60
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.
ACCELERATION GS
2.000
1.800
1.600
1.400
1.200
1.000
0.800
0.600
0.400
0.200
0.
.05G
FREQUENCY (HZ)

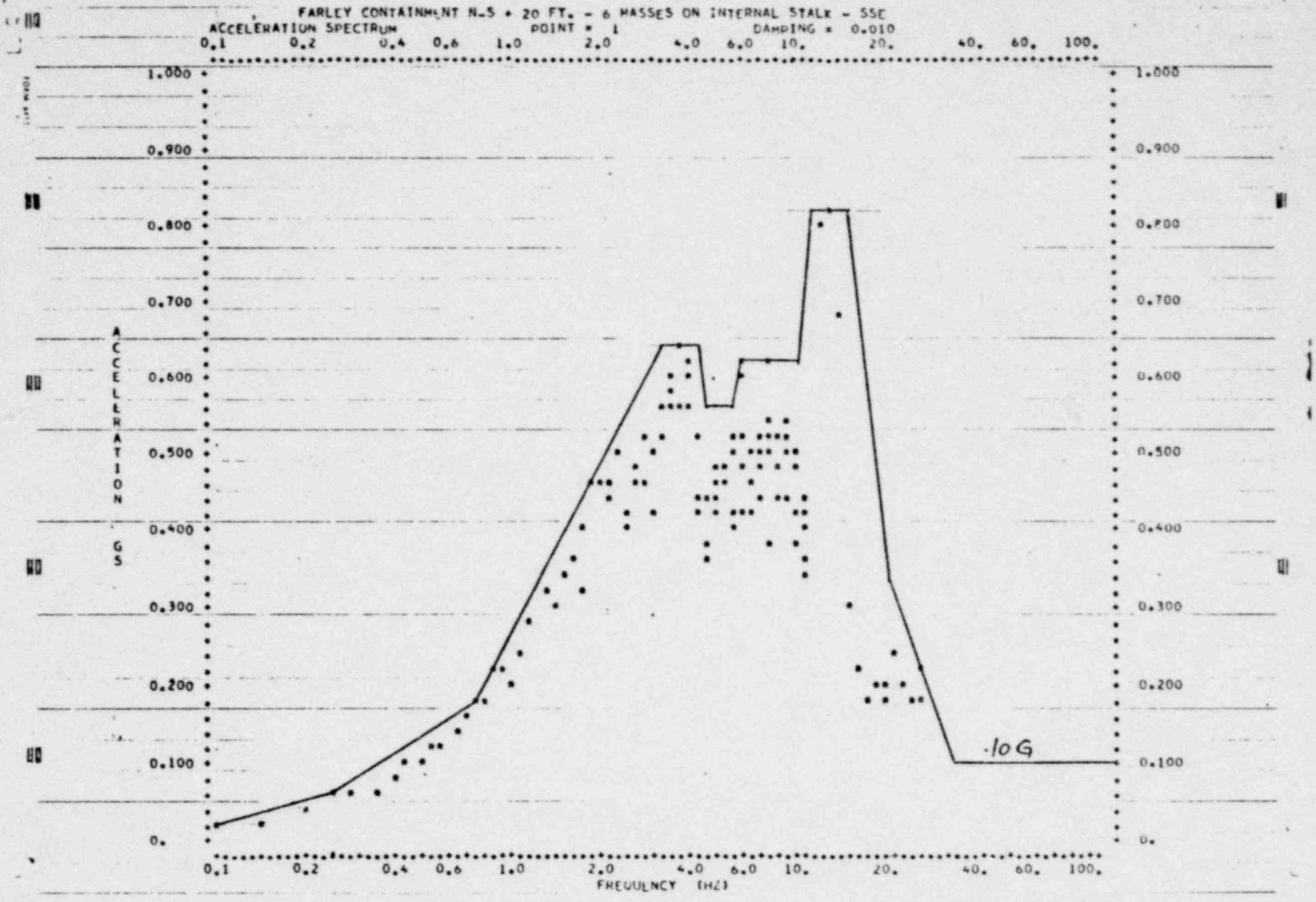

EARLY CONTAINMENT E-W + 20 FT. - 6 MASSES ON INTERNAL STALK - OBE
ACCELERATION SPECTRUM
POINT = 6
DAMPING = 0.005
0.1
0.2
0.4
0.6
1.0
2.0
4.0
6.0
10.
20.
40.
60.
100.
3.00
2.70
2.40
2.10
1.80
1.50
1.20
0.90
0.60
0.30
0.
3.000
2.700
2.400
2.100
1.800
1.500
1.200
0.900
0.600
0.300
0.
ACCELERATION GS
.09G
FREQUENCY (HZ)

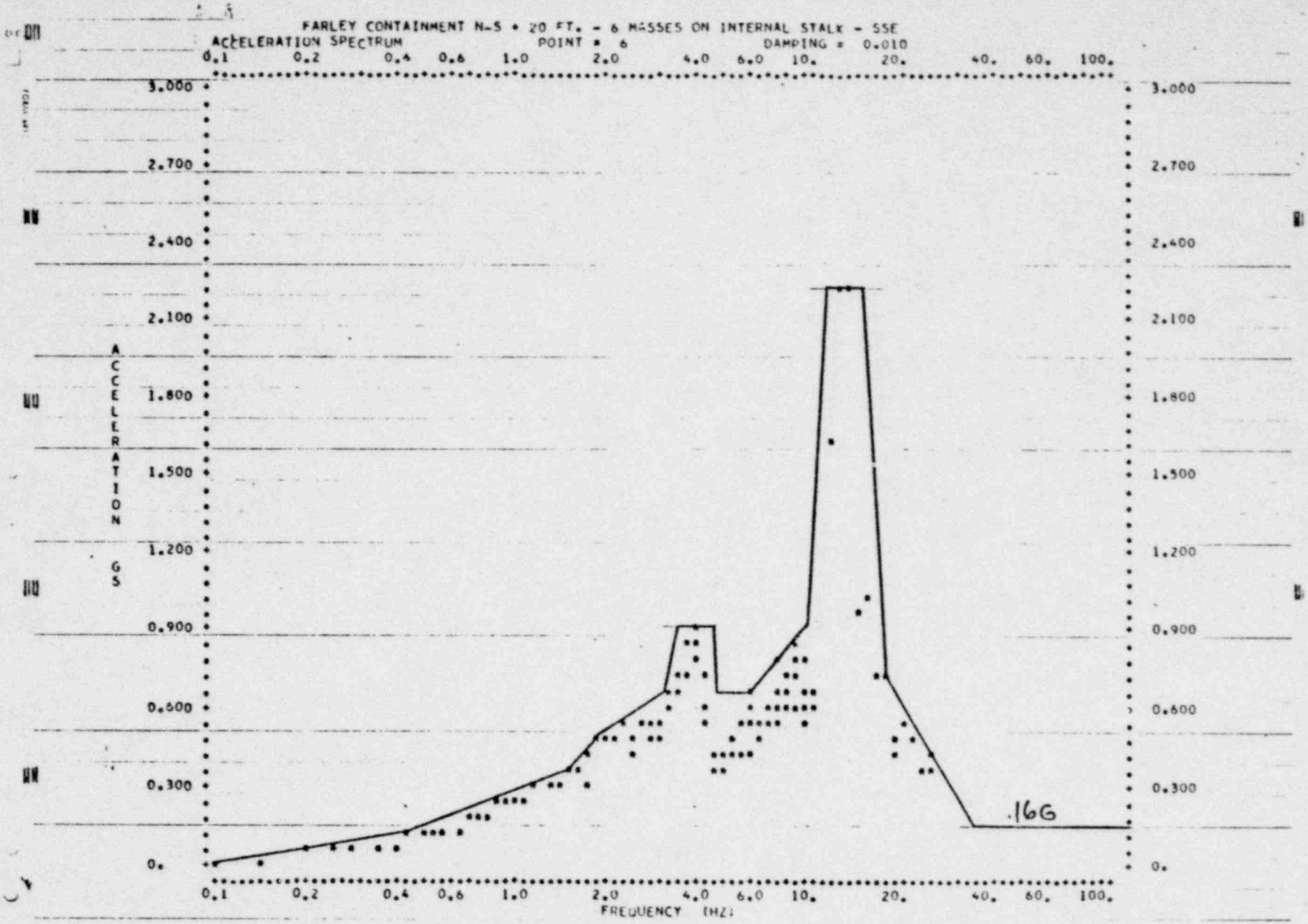

FARLEY CONTAINMENT E-W + 20 FT. - 6 MASSES ON INTERNAL STALK - OBE
ACCELERATION SPECTRUM
POINT # 6
DAMPING = 0.005
0.1
0.2
0.4
0.6
1.0
2.0
4.0
6.0
10.
20.
40.
60.
100.
2.00
1.80
1.60
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.
ACCELERATION GS
2.000
1.800
1.600
1.400
1.200
1.000
0.800
0.600
0.400
0.200
0.
.086
FREQUENCY (HZ)

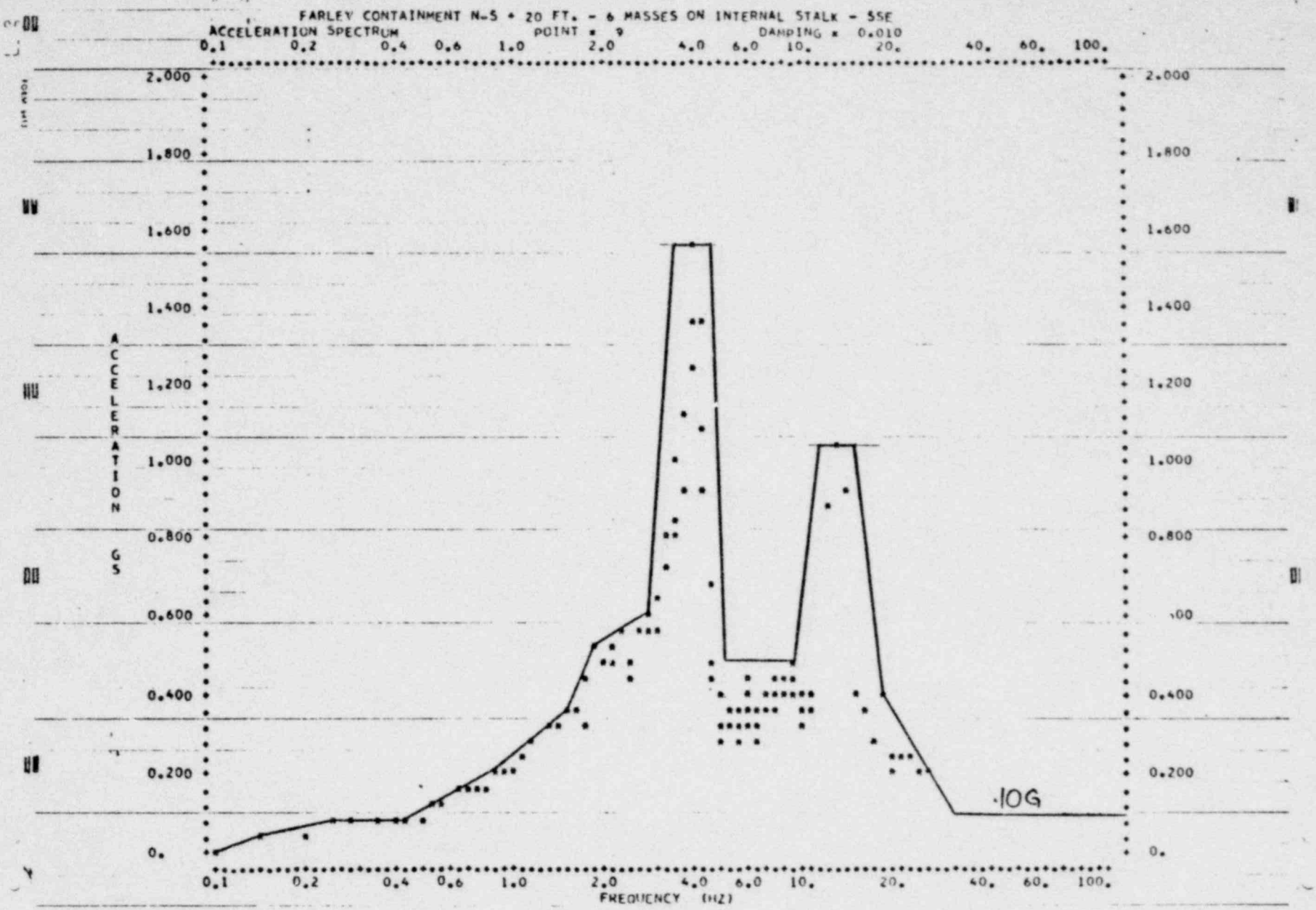

FARLEY CONTAINMENT VERTICAL + 20 FT. - 6 MASSES ON INTERNAL STALK - OBE
ACCELERATION SPECTRUM
POINT = 1
DAMPING = 0.005
NOTE:
MULTIPLY ACCELERATION
VALUES BY .667
ACCELERATION GS
FREQUENCY (HZ)
0.1
0.2
0.4
0.6
1.0
2.0
4.0
6.0
10.
20.
40.
60.
100.
2.000
1.800
1.600
1.400
1.200
1.000
0.800
0.600
0.400
0.200
0.
.059

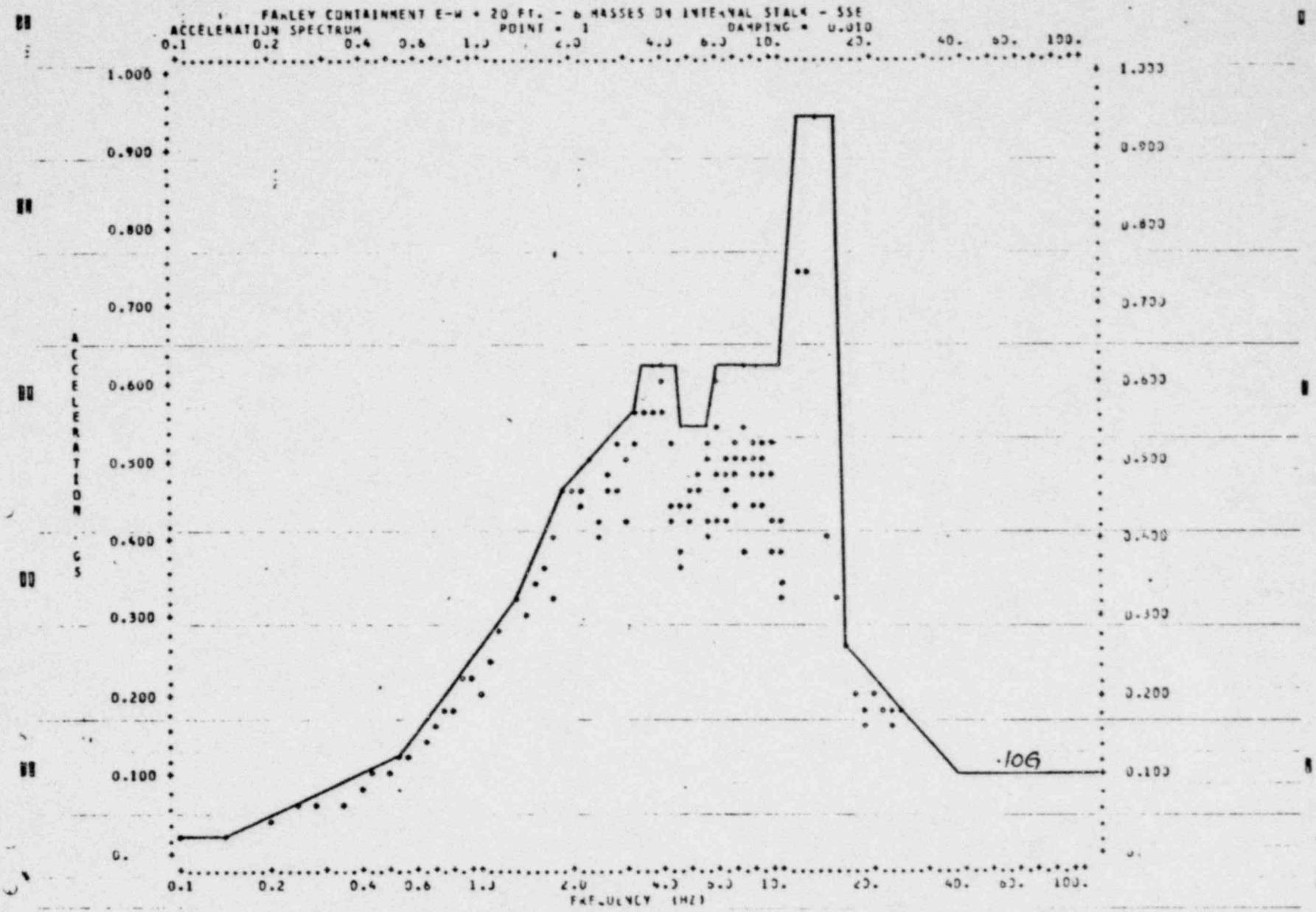

FARLEY CONTAINMENT VERTICAL + 20 FT. - 6 MASSES ON INTERNAL STALK - OBE
ACCELERATION SPECTRUM
POINT = 6
DAMPING = 0.005
NOTE:
MULTIPLY ACCELERATION
VALUES BY .667
ACCELERATION GS
FREQUENCY (HZ)
0.1
0.2
0.4
0.6
1.0
2.0
4.0
6.0
10.
20.
40.
60.
100.
2.000
1.800
1.600
1.400
1.200
1.000
0.800
0.600
0.400
0.200
0.
.057G

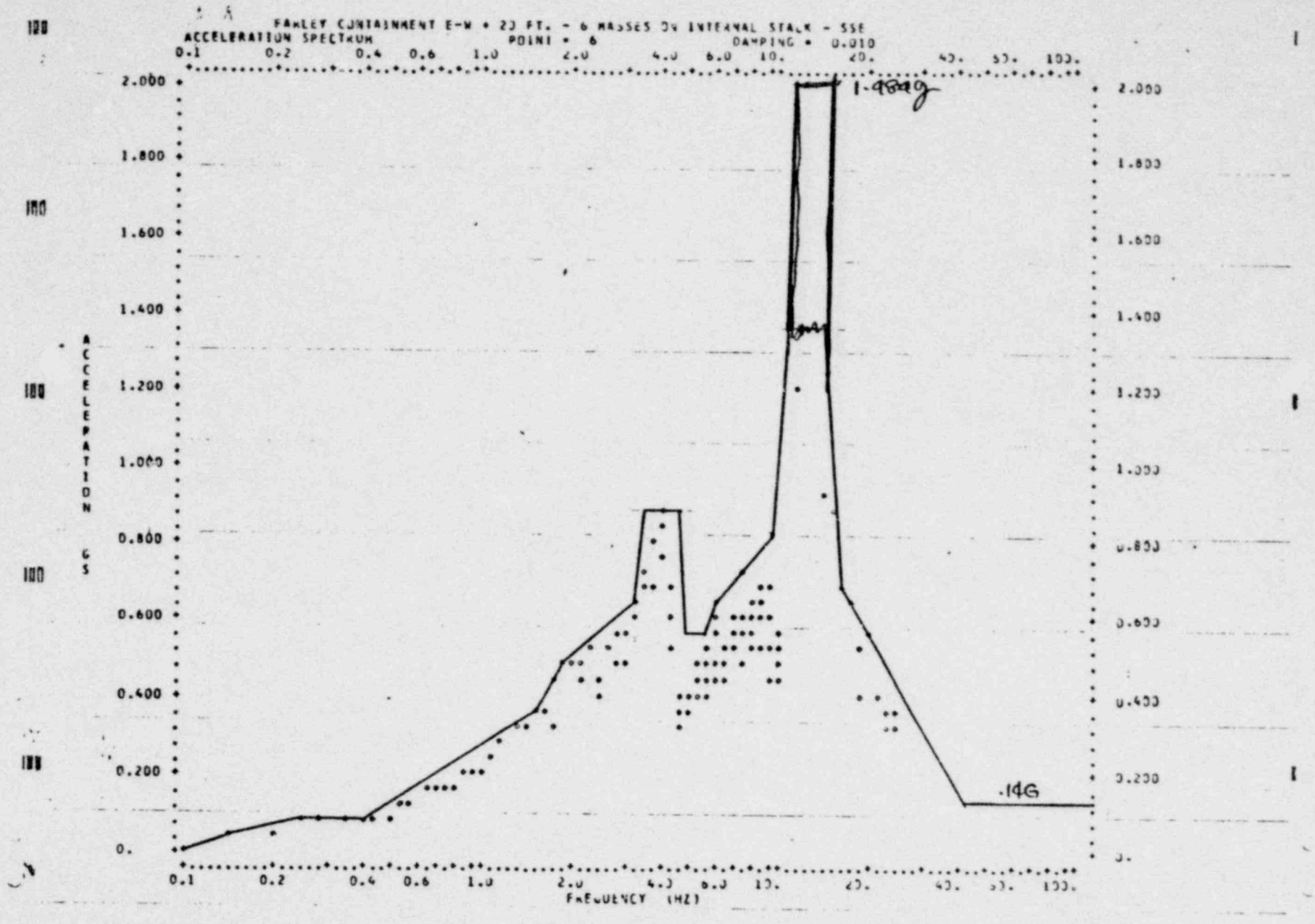

FARLEY CONTAINMENT VERTICAL + 20 FT. - 6 MASSES ON INTERNAL STALK - OBE
ACCELERATION SPECTRUM
POINT = 9
DAMPING = 0.005
NOTE:
MULTIPLY ACCELERATION VALUES BY .667
ACCELERATION GS
FREQUENCY (HZ)
0.1
0.2
0.4
0.6
1.0
2.0
4.0
6.0
10.
20.
40.
60.
100.
3.000
2.700
2.400
2.100
1.800
1.500
1.200
0.900
0.600
0.300
0.
.0726

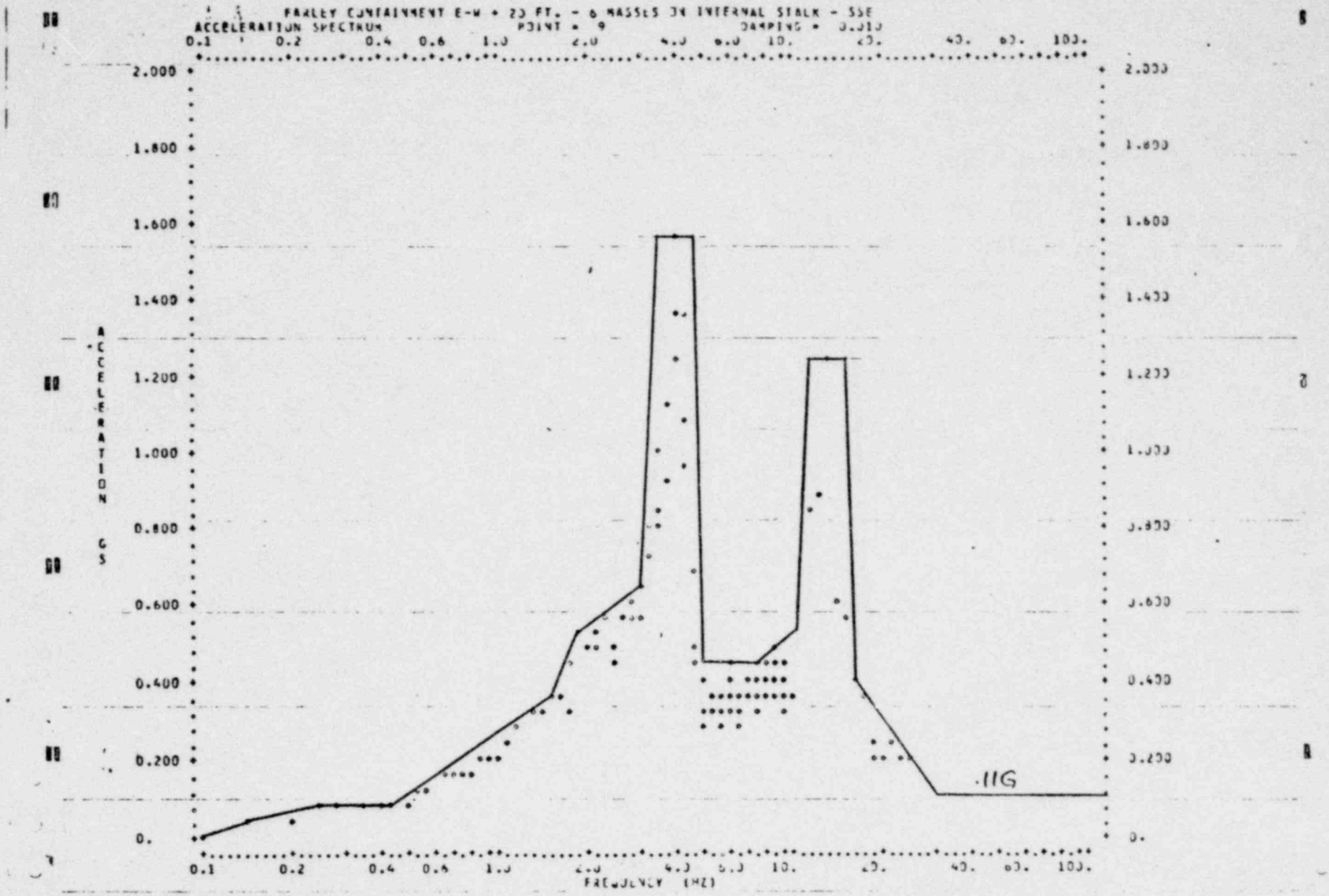

FARLEY CONTAINMENT N-S + 20 FT. - 6 MASSES ON INTERNAL STALK - SSE
ACCELERATION SPECTRUM
POINT = 1
DAMPING = 0.010
ACCELERATION GS
FREQUENCY (HZ)
0.1
0.2
0.4
0.6
1.0
2.0
4.0
6.0
10.
20.
40.
60.
100.
1.000
0.900
0.800
0.700
0.600
0.500
0.400
0.300
0.200
0.100
0.
.10 G

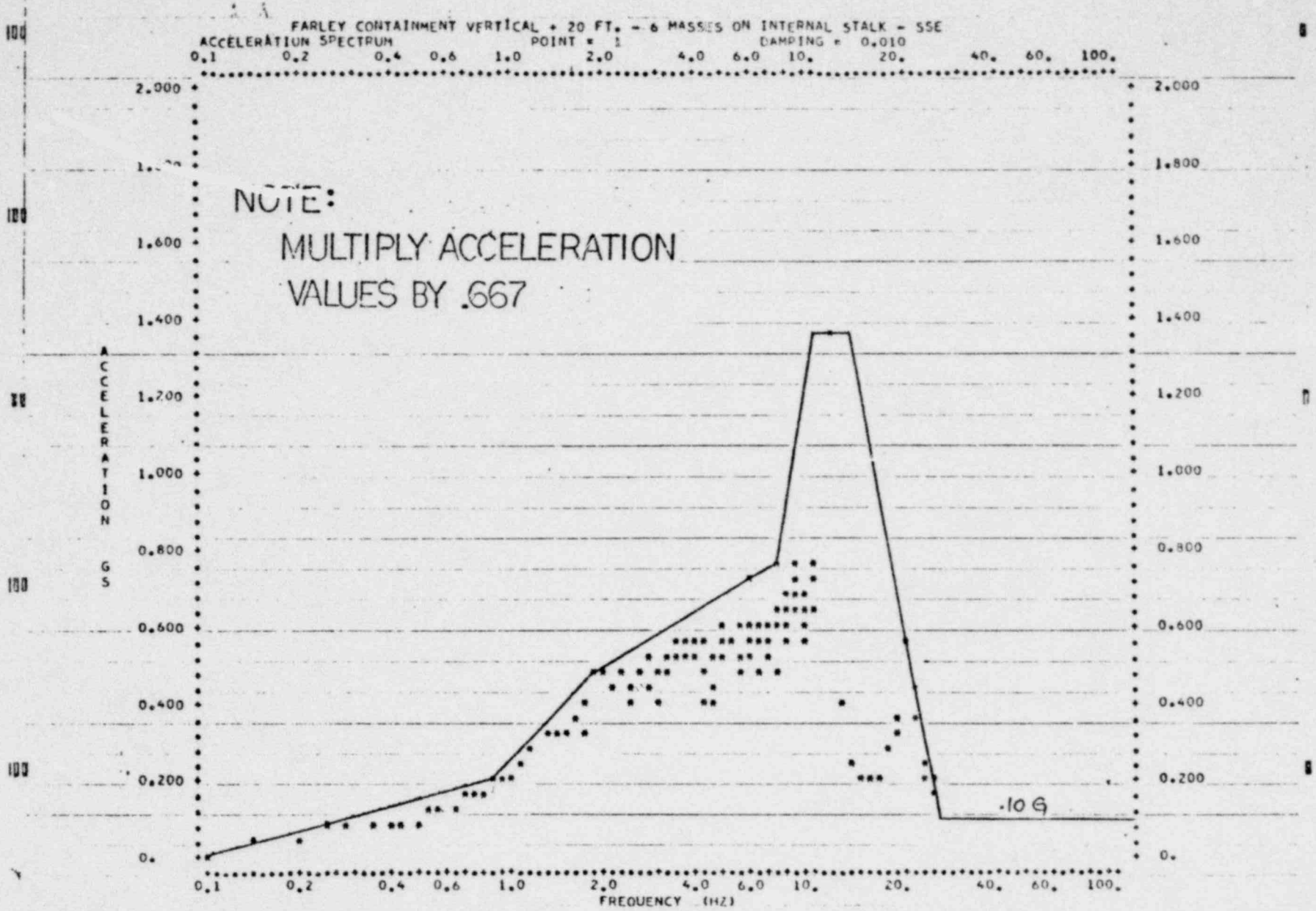

FARLEY CONTAINMENT N-S + 20 FT. - 6 MASSES ON INTERNAL STALK - SSE
ACCELERATION SPECTRUM
POINT # 6
DAMPING = 0.010
0.1
0.2
0.4
0.6
1.0
2.0
4.0
6.0
10.
20.
40.
60.
100.
3.000
2.700
2.400
2.100
1.800
1.500
1.200
0.900
0.600
0.300
0.
ACCELERATION GS
FREQUENCY (HZ)
.16G

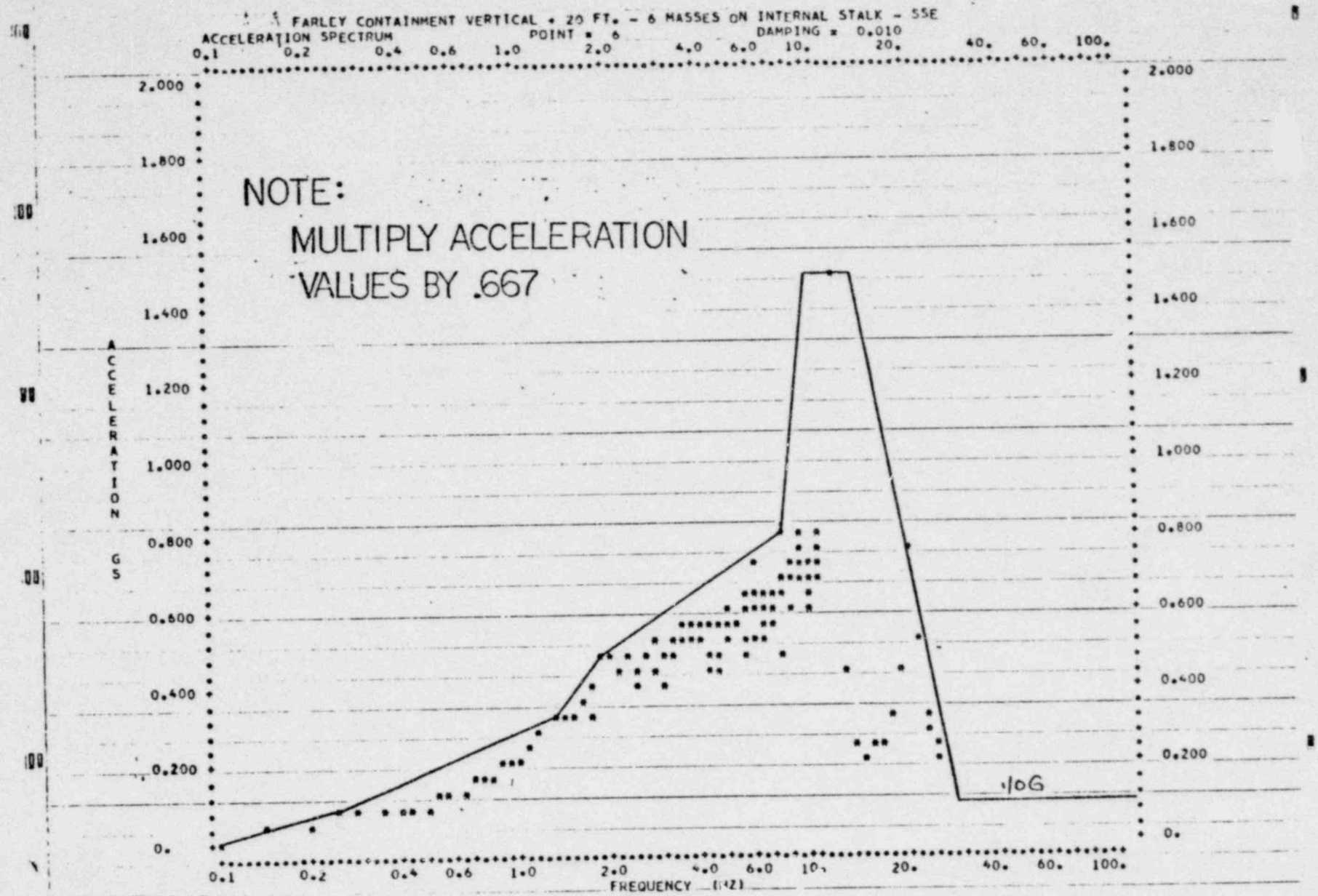

FARLEY CONTAINMENT N-S + 20 FT. - 6 MASSES ON INTERNAL STALK - SSE
ACCELERATION SPECTRUM
POINT = 9
DAMPING = 0.010
0.1
0.2
0.4
0.6
1.0
2.0
4.0
6.0
10.
20.
40.
60.
100.
2.000
1.800
1.600
1.400
1.200
1.000
0.800
0.600
0.400
0.200
0.
ACCELERATION
G'S
FREQUENCY (HZ)
106

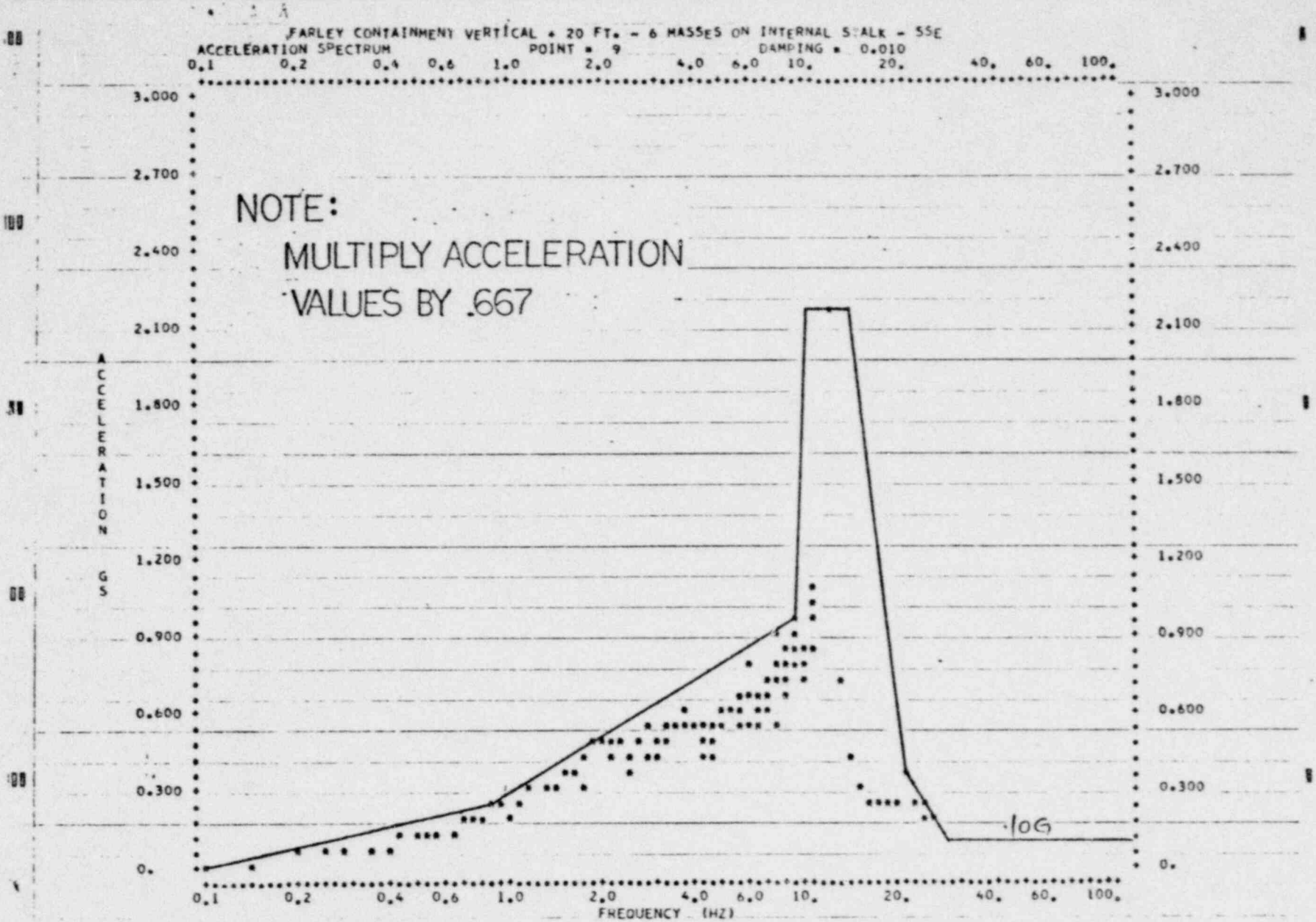

FARLEY CONTAINMENT E-W + 20 FT. - 6 MASSES ON INTERNAL STICK - SSE
ACCELERATION SPECTRUM
POINT = 1
DAMPING = 0.010
0.1
0.2
0.4
0.6
1.0
2.0
4.0
6.0
10.
20.
40.
60.
100.
1.000
0.900
0.800
0.700
0.600
0.500
0.400
0.300
0.200
0.100
0.
ACCELERATION - GS
FREQUENCY (HZ)
106


FARLEY CONTAINMENT E-W + 20 FT. - 6 MASSES ON INTERNAL STALK - SSE
ACCELERATION SPECTRUM
POINT = 6
DAMPING = 0.010
0.1
0.2
0.4
0.6
1.0
2.0
4.0
6.0
10.
20.
40.
50.
100.
2.000
1.800
1.600
1.400
1.200
1.000
0.800
0.600
0.400
0.200
0.
ACCELERATION GS
1.48g
.14G
FREQUENCY (HZ)


PARLEY CONTAINMENT E-W + 23 FT. - 6 MASSES IN INTERNAL STALK - SSE
ACCELERATION SPECTRUM
POINT = 9
DAMPING = 0.010
0.1
0.2
0.4
0.6
1.0
2.0
4.0
6.0
10.
20.
40.
60.
100.
2.000
1.800
1.600
1.400
1.200
1.000
0.800
0.600
0.400
0.200
0.
ACCELERATION G'S
FREQUENCY (HZ)
.116


FARLEY CONTAINMENT VERTICAL + 20 FT. - 6 MASSES ON INTERNAL STALK - SSE
ACCELERATION SPECTRUM
POINT = 1
DAMPING = 0.010
0.1
0.2
0.4
0.6
1.0
2.0
4.0
6.0
10.
20.
40.
60.
100.
2.000
1.800
1.600
1.400
1.200
1.000
0.800
0.600
0.400
0.200
0.
ACCELERATION G'S
NOTE:
MULTIPLY ACCELERATION
VALUES BY .667
.10 G
FREQUENCY (HZ)


FARLEY CONTAINMENT VERTICAL + 20 FT. - 6 MASSES ON INTERNAL STALK - SSE
ACCELERATION SPECTRUM
POINT = 6
DAMPING = 0.010
NOTE:
MULTIPLY ACCELERATION VALUES BY .667
ACCELERATION GS
FREQUENCY (HZ)
0.1
0.2
0.4
0.6
1.0
2.0
4.0
6.0
10.
20.
40.
60.
100.
0.
0.200
0.400
0.600
0.800
1.000
1.200
1.400
1.600
1.800
2.000
106


FARLEY CONTAINMENT VERTICAL + 20 FT. - 6 MASSES ON INTERNAL STALK - SSE
ACCELERATION SPECTRUM
POINT = 9
DAMPING = 0.010
0.1 0.2 0.4 0.6 1.0 2.0 4.0 6.0 10. 20. 40. 60. 100.
3.000
2.700
2.400
2.100
1.800
1.500
1.200
0.900
0.600
0.300
0.
ACCELERATION GS
NOTE:
MULTIPLY ACCELERATION VALUES BY .667
.10G
FREQUENCY (HZ)

'As-Built' support sketches received as of 2-29-80.

Main steam loop 'A'

FORM G 3 200 M 3-62 SPH

BECHTEL

MEMORANDUM

"DON'T SAY IT – WRITE IT"

To W. B. KELLER / V. DURVVASULA Location 2D-20

From A. ANAND / K.C. DATEL Date 2/13/80

Subject: SUPPORT STIFFNESS - GRINNELL ISO 2-3 MAIN STEAM

PLEASE FIND TABULATED BELOW SUPPORT STIFFENESSES REQUESTED IN YOUR MEMO OF 1/14/80.

SUPPORT MARK NO.	CALC. NO.	K VERTICAL #/IN	K_x #/IN	K_z #/IN	REMARKS
2MS-R95	2-5094	5196.0	—	—	SPRING INVOLVED
2MS-R96	2-5095	—	3.03×10^5	—	DIRECTION PARALLEL TO LONG. AXIS OF SNUBBER
R97	2-5096A	—	—	1.17×10^5	
2MS-R98	2-5097	5.29×10^5	—	—	
2MS-R99	2-5098	—	4.81×10^5	—	
2MS-R100	2-5099	—	—	4.47×10^5	
2MS-R612		—	2.189×10^5	—	STRUCTURE IS OVERSTRESSED FOR TOTAL DESIGN LOAD.
2MS-R613		2654.0	—	—	SPRING INVOLVED
2MS-R614	2-5613	8.83×10^4	—	—	

PLEASE CONTACT US IF YOU NEED ADDITIONAL INFORMATION.

GPD-4906 1/76 (FORM G-3)

MEMORANDUM

"DON'T SAY IT – WRITE IT"

To B. KELLER / V. DURVASULA Location 2D-20

From A. ANAND / D. HOPPER Date 2/21/80

Subject: SUPPORT STIFFNESS - GRINNELL ISO 2-3 MAIN STEAM

LISTED BELOW ARE STIFFNESS VALUES FOR SUPPORT 2MS-RG12 WHICH SUPERSEDE THE VALUE TRANSMITTED BY OUR MEMO OF 2/13/80.

PLEASE NOTE THAT STIFFNESSES ARE PROVIDED FOR (1) EXISTING OVERSTRESSED STRUCTURE, AND (2) PROPOSED MODIFICATION OF STRUCTURE. THE PROPOSED MODIFICATION HAS NOT YET BEEN APPROVED.

(1) K_x (EXIST.) = 1.603×10^5 #/IN

(2) K_x (PROPOSED) = 3.089×10^5 #/IN

FIELD CHANGE REQUEST

FCR NO. 2M-50018
SH 1 OF 5

Joseph M. Farley Plant - Unit II
Field QC Procedure No. 5.3.2.1A
Drawing No.: N/A
Drawing Title: HANGER SKETCHES

Date 1/12/80
TPNS No. A17.07
Revision N/A
System ALL

Addressed to: APCO Construction - Attention J. A. MOONEY
Southern Services, Inc. - Attn.
Bechtel Corporation - Attention A. A. VIZZI
ITT Grinnell Corporation (Hanger Div.)

Originator: E. Blackburn SH 1 of 2 PDE: T. Mesa

QCM L. Eastwood

Existing Condition:

THE FOLLOWING LIST OF "AS BUILT" HANGERS WHICH CONSTITUTE A CLUSTER HAVE BEEN FIELD VERIFIED PER NRC BULLETIN 79.14 GUIDELINES:

MARK NO.	ISO NO.	CV NO.	DANIEL REV.
MS-R100	3	26	0
MS-R614	3	26	0

ABOVE CLUSTER IS PER 79.14 ONLY, NO BOLTS INVOLVED.

DANIEL CONSTRUCTORS OF ALA. DOCUMENT CONTROL JAN 1980

Recommended Action and Responsible Party: | ATTEN: R. GANTI BECHTEL

RECEIVED JAN 21 1980 JOB 7597-C 3/20 BECHTEL

PLEASE APPROVE ATTACHED "AS BUILT SKETCH(S).

URGENCY:
(1) Needed by NOON (time) on 1/24/80 (date)
(2)Justification: 79.14 and 79.02 COMPLETION

APCO NPD REPLY:
Disposition Reference CN No.
QC Hold Tag No. (if applicable):
DISTRIBUTION: QC FOR SUSPENSE FILE, APCO QA FIELD REPRESENTATIVE, APCO NPD, ALL CONST. SUPERINTENDENTS

CUSTOMER

ORDER OR CONT. No.

JOB NAME FARLEY NUCLEAR PLANT

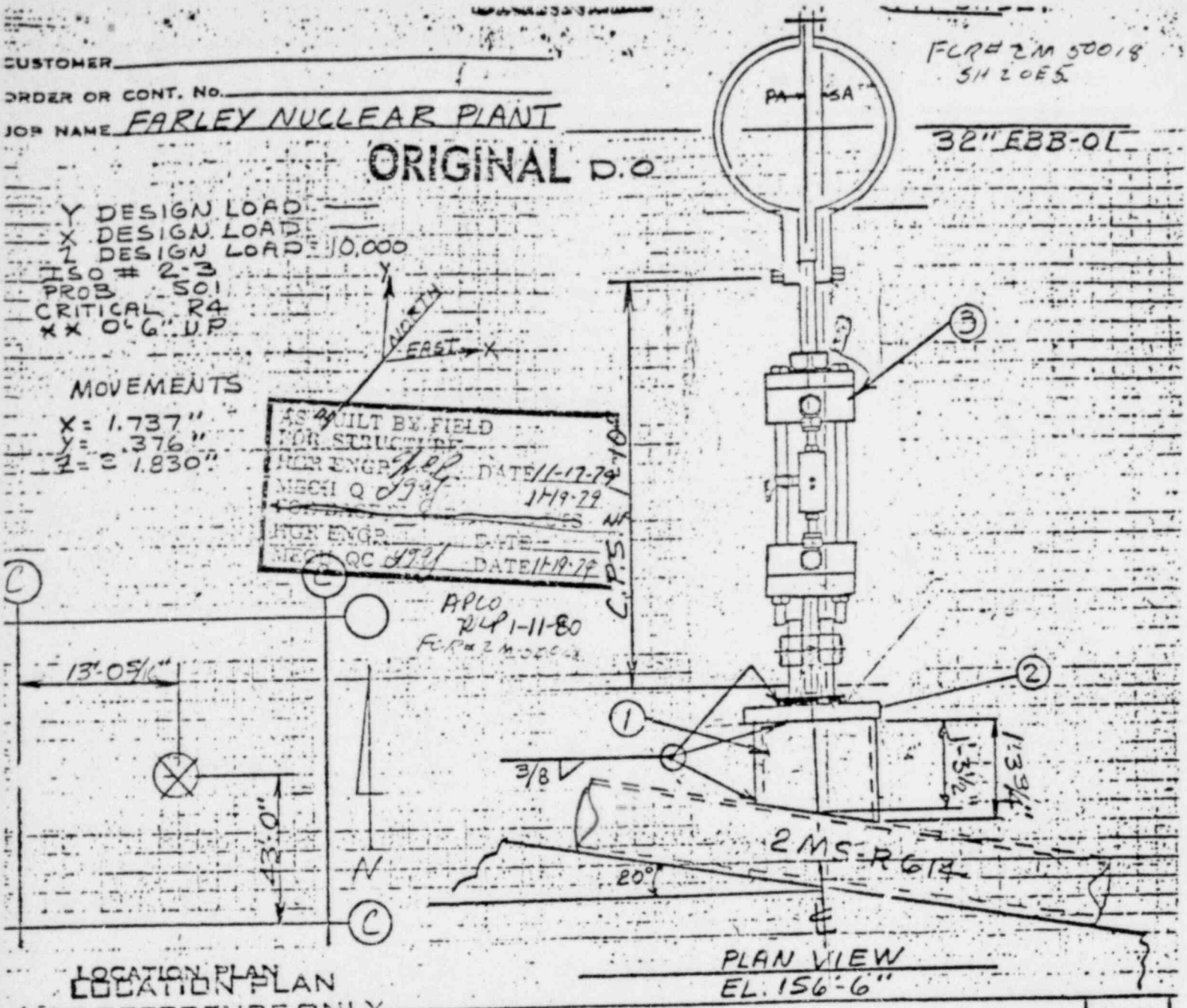
FCR# 2M 50018
SH 2 OF 5

32" EBB-0L

ORIGINAL D.O

Y DESIGN LOAD
X DESIGN LOAD
Z DESIGN LOAD = 10,000
ISO # 2-3
PROB 501
CRITICAL R4
** 0'-6" U.P

MOVEMENTS
X = 1.737"
Y = .376"
Z = ± 1.830"



ITEM NO.	MATERIALS AND OPERATIONS	QUAN.
1	1/2" X 6" X 6" T.S. 1'-3 3/4" LONG HT# 13500	1
2	1 1/2" X 8" C/S PL 0'-8" LG. HT# X01135	1
3	4" CYLINDER, 5" STROKE, FIG 200 OPTION #3, 32" O.D. PIPE, CARBON STEEL, HYDRAULIC SHOCK & SWAY SUPPRESSOR LOAD = 18,000 # COLD PISTON SETTING = 2 3/4", HOT PISTON SETTING = 4 1/2" / PH-74, W RESERVOIR IN ALTERNATE POSTION	
	SEISMIC ASSEMBLY SKETCH & ENGINEERING	1
	BUNDLE & TAG	1
	MARK # 2 MS-R100	

SHT 1 OF 1

HARBAU PIP. CO.
CONT. No. FWP-2-80
NAME FARLEY NUC STA UNIT #2

CHECK BY ____ DATE ____
DRAWN BY ____ DATE ____

REV.	1	2	3	4
ENG / DATE				

ORIGINAL D.O.

FCR 2M-50018 SH 3 OF 5

U2770

STEEL EXISTS FEP WHIP RESTRAINT 2MSP-3 W14 x 176

FW 1/4 V (2) SIDES (TYP)

2'-3" 2'-3"

2" 1½" 45°

32" PIPE

3'-3"

4'-1½"

90°

SEE DETAIL "A" TYPICAL

℄ OF CLEVIS

STEEL EXISTS FEE WHIP RESTRAINT 2FW3 W 12 x 161

TYP FW 3/8

2MS-R100

2"

36¾"

TYP 3/8 FW

5'-0"

6" 6" (TYP)

1'-10"

EMBED EXISTS CONCRETE EXISTS

6'-4"

FW 3/8

2½"

29°-29'

3'-0"

3/8

3"

EMBED EXISTS

PLAN VIEW @ EL. 159'-0"

℄ CONT.

13'-0 5/16"

18'-0"

℄ CONT.

LOCATION PLAN

MOVEMENTS

X = 1.655"

Y = 0.546"

Z = 1.907"

Y Design Load = 11,0
Axial Design Load =
Lat'l Design Load =
Iso. # 2-3
Prob. # 501
Critical Pipe

AS BUILT BY FIELD
FOR STRUCTURE
HGR ENGR [illegible] DATE 11/19/80
MECH QC [illegible] DATE 11-21
HGR ENGR ____ DATE ____
MECH QC [illegible] DATE 11-21

APPD RLW 1-11-80

LOCATION PER FOR MATERIALS AND OPERATIONS SEE SKETCH No 2-5613A

REFERENCE DRAWINGS

REF. DRW'G. Nos. PIPE D-205300-4
STEEL D-206326-2
MARK No. 2 MS-R614
SKETCH No. 2-5613 REV. -

ALABAMA PWR. CO.

CONT. No. EXP-2-79

NAME DARLEY MUC. STA. UNIT #2

CHECK BY ____ DATE ____

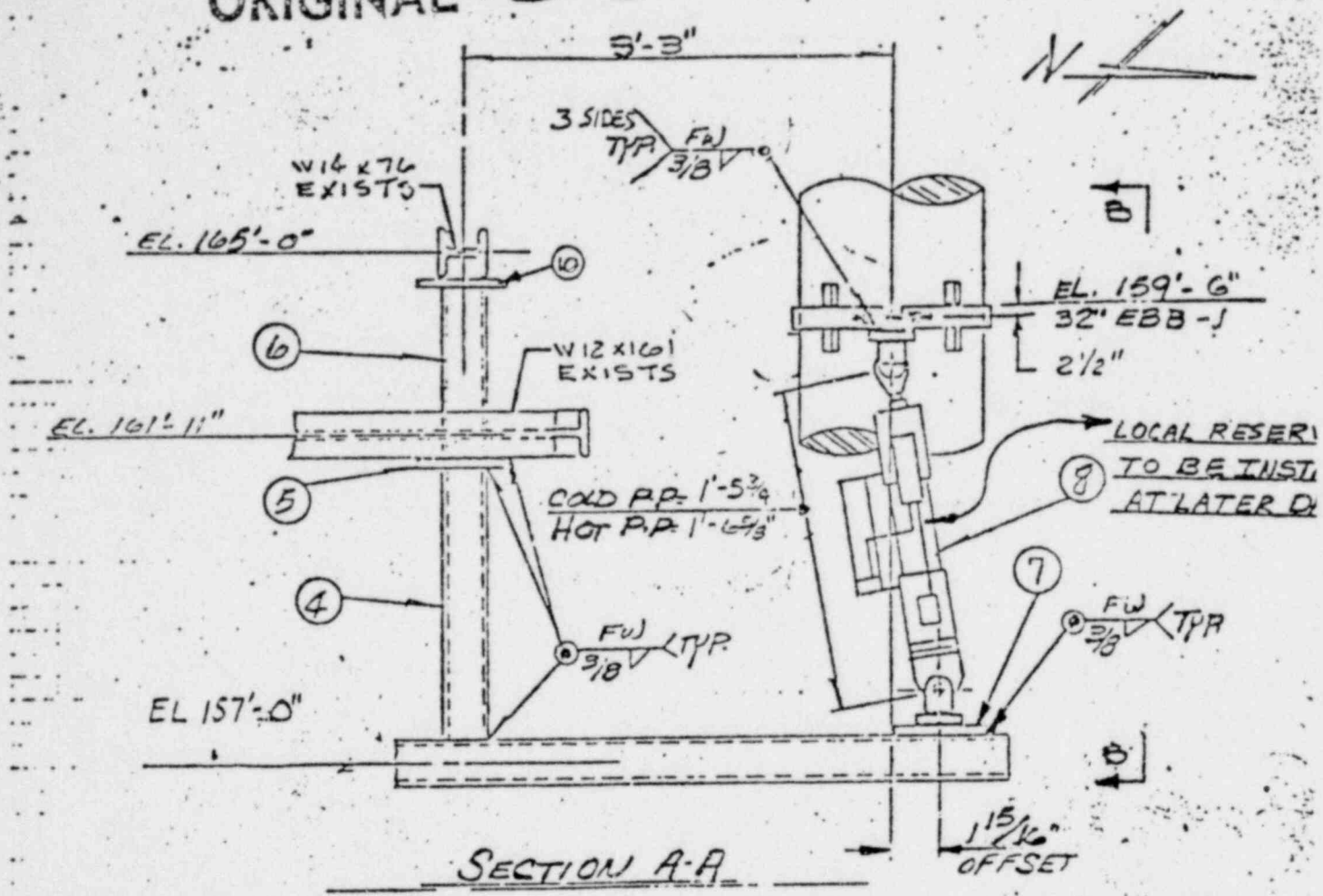
DRAWN BY ____ DATE 5/11/79

REV.	1	2	3	4
ENG / DATE				

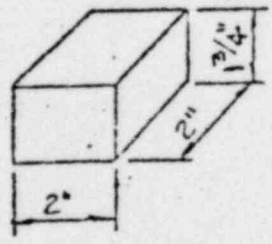
FOR # 2 MSD 018 SH 4 OF 5

U27703

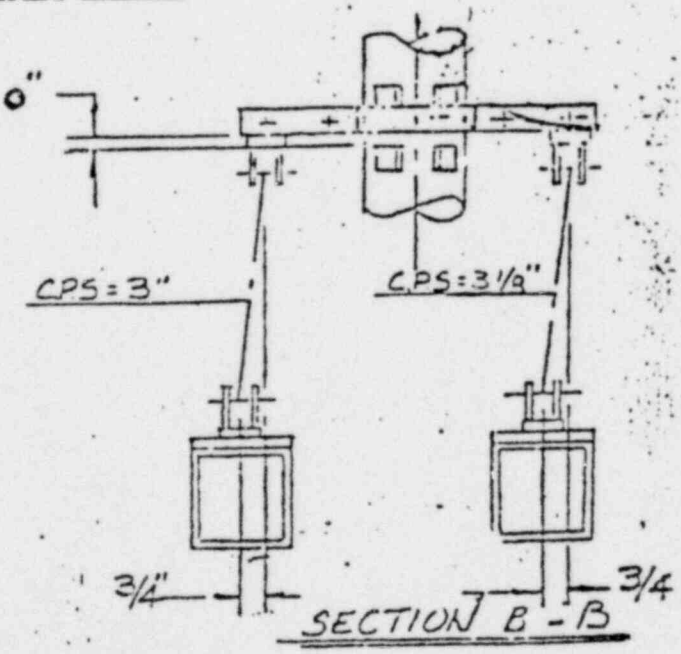
ORIGINAL D.O.



SECTION A-A



DETAIL "A"



SECTION B-B

FOR MATERIALS AND OPERATIONS SEE SKETCH No 2-561136 REV ____

SHEET 2 of 3

PIPE D-205300-4 MSK No 2-MS-RG14 SKETCH NO. 2-561138A REV

ALABAMA PWR. CO.

CONT. NO. HP-2-29

FARLEY NUC. STA. UNIT #2

CHECK BY [illegible] DATE 3-12-77

DRAWN BY _____ DATE _____

REV.	1	2	3	4	5
ENG / DATE	[illegible]				

FCR # 2M5008
SH 5 OF 5

U2770

ORIGINAL DO:

SEISMIC HYDRAULIC SHOCK & SWAY SUPPRESSOR CONSISTING OF: ONE

MATERIAL BY D.C.C.A.

1	1/2"x8"x8" T.S., 8'-2" long — NEW MATERIAL BY D.C.C.A. HT. 80677	1
2	1/2"x8"x8" T.S. 6'-3" Long — — — — HT. 80677	2
3	1 3/4"x2" Carbon Steel (SA515 GR.65) Lugs, 0'-2" long Traceability Required — — — — — — — HT 2G9123	8
4	1/2"x8"x8" T.S. 3'-11 1/2" Long — — — — HT. 80677	1
5	5/8"x1'-2" Carbon Steel Plate, 1'-4" long — HT. 7481111	2
6	1/2"x8"x8" T.S., 6'-11 1/4" long — — — HT. 80677	1
7	1/2"x8" Carbon Steel Plate, 0'-8" long — — HT X01135	2

MATERIAL BY ITT GRINNELL:

8	2 1/2" Cylinder, 5" Stroke, Fig. 200, Option #2, Hydraulic Shock & Sway Suppressor, Load=5,500#, Cold Piston Setting= 3 1/8", Hot Piston Setting= 3 3/16", PH-74 w/Manifold Arrangment/Sketch# BH-1230 & Reservoir In Alternate Position — — RESERVOIR SHOULD BE ABOVE SNUBBER.	2
9	H.S. 40, "A", Carbon Steel (A515 GR.65) 32" O.D. Pipe, Developed Length/Half Clamp=6'-5 15/16", E=2'-3", F(All Studs)=1 1/4"x7 3/4", G=1 1/4"x6", S=2 1/4", K=1'-2 7/8", A*=3", TW=349#	1

SEISMIC ASSEMBLY SKETCH & ENGINEERING 1

BUNDLE & TAG 1

MARK# 2-MS-R614

10. 5/8" X 14" X 1'-3 1/2" LG. C/S PLATE — — HT. 7481111 — 1

APPLY DIMETCOTE #6 PRIMER TO ALL ABOVE MATERIAL EXCEPT THREADS WHICH SHALL BE GREASED.

FOR MATERIALS AND OPERATIONS SEE SKETCH No. 2-5613 REV _____ SHEET 3 of 3

REF. DRW'G. Nos. PIPE D-205300-4 D-7111-2716-7 MARK No. 2-MS-R614 SKETCH No. 2-5613 B REV.

FIELD CHANGE REQUEST

FCR NO. 2M-50156

Joseph M. Farley Plant - Unit II
Field QC Procedure No. 5.3.2.IA
Drawing No.: N/A
Drawing Title: HANGER SKETCHES

Date 1/25/80
TPNS No. A17.07
Revision N/A
System ALL

Addressed to: APCO Construction - Attention J. A. MOONEY
Southern Services, Inc. - Attn.
Bechtel Corporation - Attention A. A. VIZZI
ITT Grinnell Corporation (Hanger Div.)

Originator: S F Madill PDE: T Mussey

QCM L C Easterwood

Existing Condition:

THE FOLLOWING LIST OF "AS BUILT" HANGERS WHICH CONSTITUTE A CLUSTER HAVE BEEN FIELD VERIFIED PER NRC BULLETIN 79.14 GUIDELINES:

MARK NO.	ISO NO.	CV NO.	DANIEL REV
2MS-R95	2-3	026	D.1
2MS-R96	2-3	026	D.0

DANIEL CONSTRUCTION OF ALA. RECEIVED JAN 29 1980 DOCUMENT CONTROL

ABOVE CLUSTER TESTED PER NRC BULLETIN 79.02 GUIDELINES AND INFORMATION IS INCLUDED.

Recommended Action and Responsible Party: | ATTEN: R. GANTT/BECHTEL

PLEASE APPROVE ATTACHED "AS BUILT SKETCH(S).

URGENCY:
(1) Needed by 12:00 Noon (time) on 2/7/80 (date)
(2)Justification: 79.14 and 79.02 Completion

APCO NPD REPLY:
Disposition Reference CN No.
QC Hold Tag No. (if applicable):
DISTRIBUTION: QC FOR SUSPENSE FILE, APCO QA FIELD REPRESENTATIVE, APCO NPD, ALL CONST. SUPERINTENDENTS

CUSTOMER ALASKA T.T.S.

ORDER OR CONT. NO. T-12-6

JOB NAME TITTY

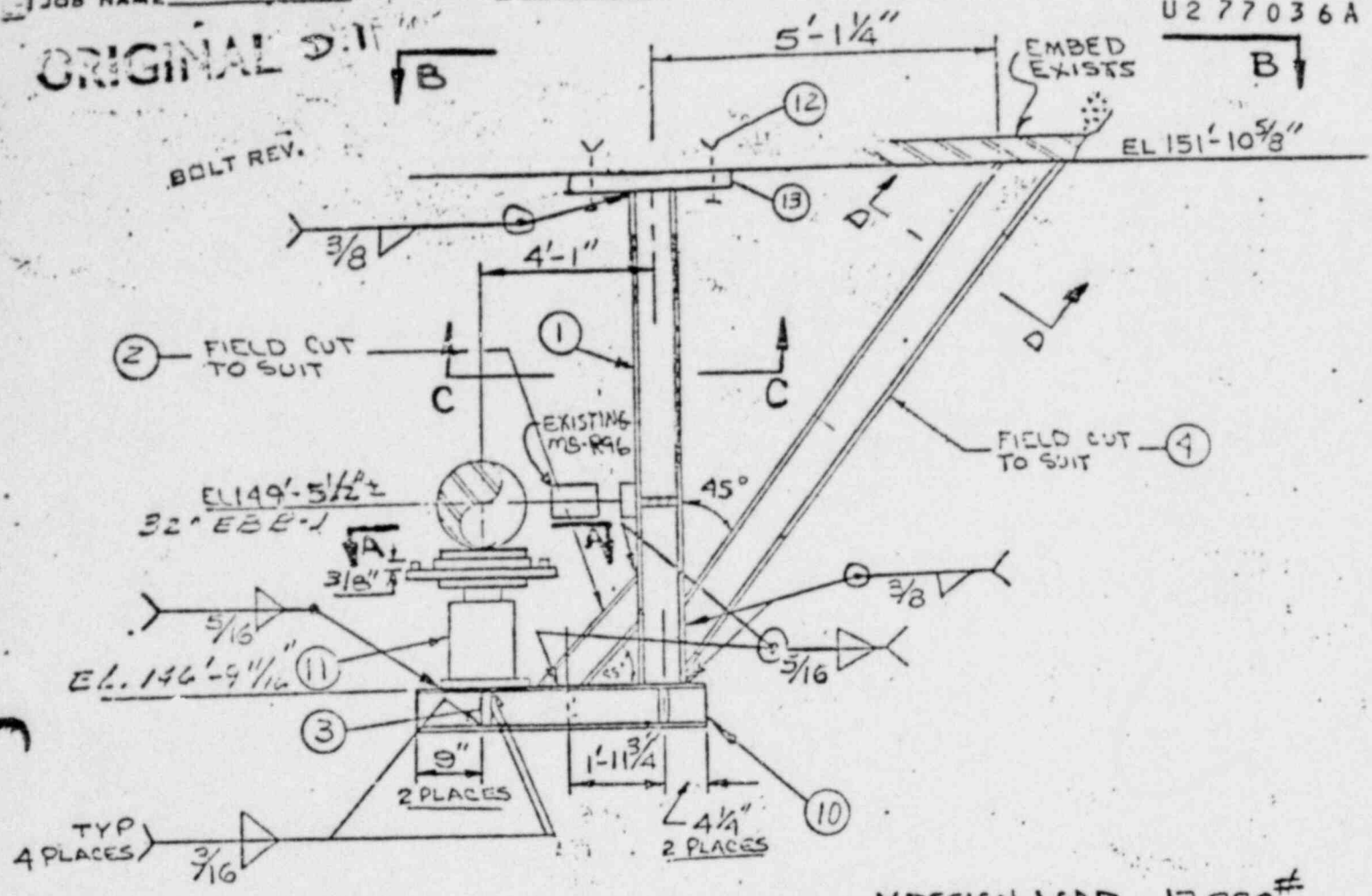
CHECK BY [illegible] DATE [illegible]

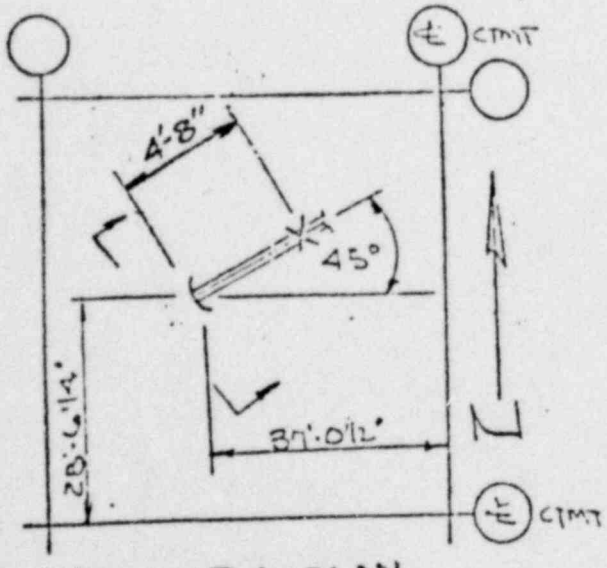
DRAWN BY DTL DATE 12-17-79

REV.	1	2	3	4	5
ENG / DATE	[illegible]				

U277036A

ORIGINAL DATE





LOCATION PLANT LAN

LOCATION PLANT LAY

FOR REFERENCE ONLY

Y DESIGN LOAD	12000#
AXIAL DESIGN LOAD	
LAT'L DESIGN LOAD	
150#	2-3
PROB#	501
CRITICAL	H-L

MOVEMENTS

X .532" FCR#

Y .368" 2M-50156

Z .010" Sheet 2 OF 9

AS BUILT BY FIELD PER Rev 1-29-80
FOR STRUCTURE
QC [illegible] DATE 1-11-80
MECH QC R. Hall DATE 1-16-80
FOR BASE PLATE AND BOLTS
QC [illegible] DATE 1-11-80
MECH QC R. Hall DATE 1-16-80

FOR MATERIALS AND OPERATIONS SEE SKETCH NO 2-5004 A REV

REF. DRW'G. Nos. PIPE D205305-4

STEEL D205215-2

MARK NO. 2-MS-R95

SKETCH NO. 2-5004 REV. 1

150# 2 3

1 OF 4

CUSTOMER ALABAMA PWR. CO.

ORDER OR CONT. NO. FNP-2-29

JOB NAME FARLEY NUC. STA. UNIT #2

DRAWN BY [illegible] DATE 12-27-77

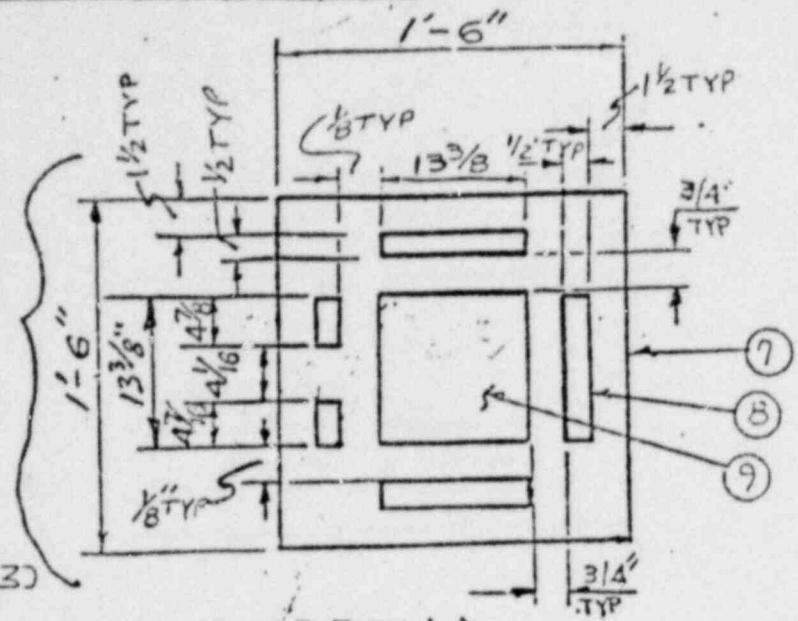
REV.	1	2	3	4	5
ENG					
DATE					

U2 770 36 A

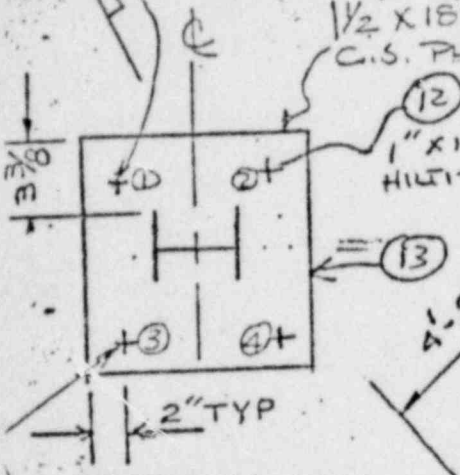
Place this edge to the Southwest

ORIGINAL D.1

BOLT REV.

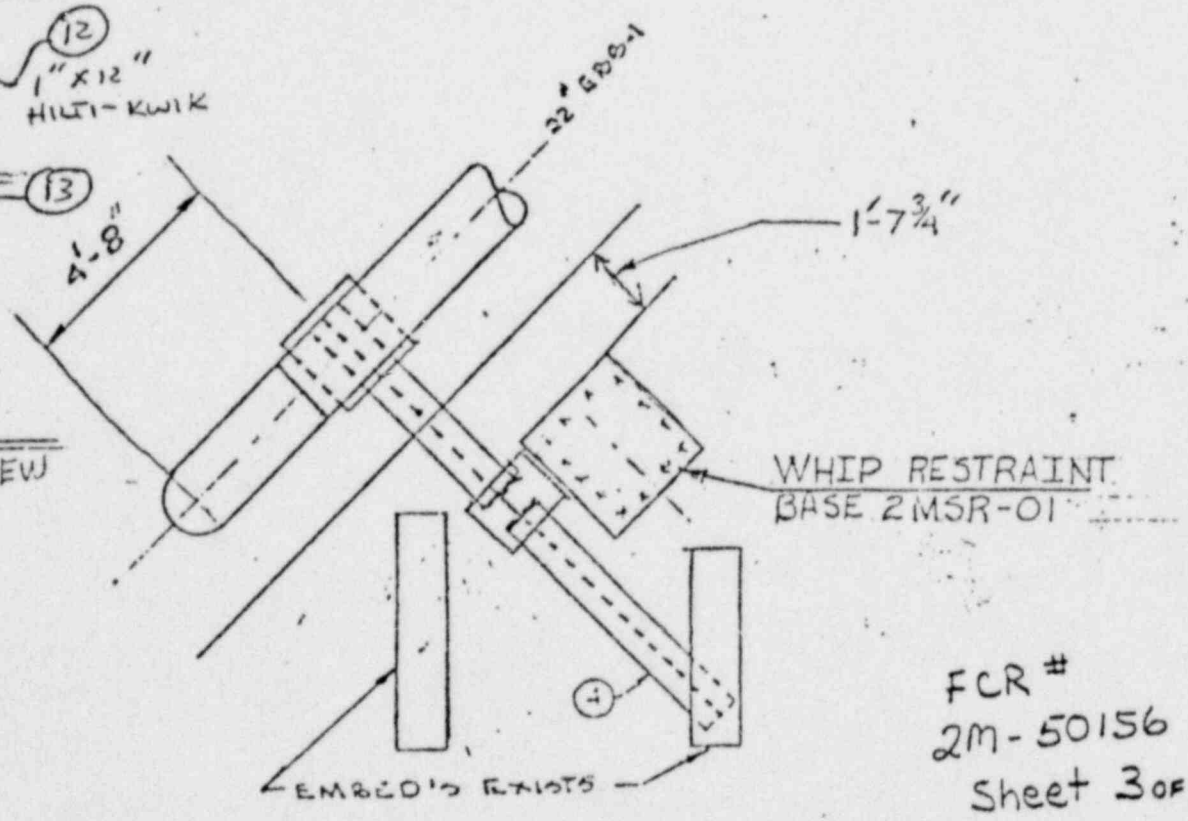


SECTION AA



SECTION CC
REFLECTED VIEW

FIELD DRILL (1) 1 5/16" HOLE.



SECTION B-B

FCR # 2M-50156
Sheet 3 OF

FOR MATERIALS AND OPERATIONS SEE SKETCH NO 2-5094B REV 1

REF. DRW'G. NOS. PIPE D205300-4 STEEL D206215-2 MARK NO 2-MS-R95 SKETCH NO 2-5094A REV 1

2 OF 4

CUSTOMER [illegible]

ORDER OR CONT. NO. [illegible]

JOB NAME [illegible]

DRAWN BY [illegible] DATE [illegible]

REV.	1	2	3	4	5
ENG					
DATE					

U277036

ORIGINAL D-1

		ONE
	PIPE SUPPORT CONSISTING OF: FOLLOWING MATERIAL EXISTING IN FIELD BY D.C.C.A.	
2	W8x58, 3'-0" Long BOLT REV.	1
4	W8x58, 6'-10 1/4" Long HT# 78865	1
10	W8x58, 5'-3" Long	
	FOLLOWING NEW MATERIAL REQUIRED BY D.C.C.A.	
1	W8x58 4'-11 1/16" LONG	1
3	1/4"x3 1/2" Carbon Steel Stiffener Plate, 0'-7" Long HT=7489139	4
7	1/2"x1'-6" Carbon Steel Plate, 1'-6" Long HT U60810	1
8	3/8"x1/2" Carbon Steel Bar, 0'-13 3/8" Long HT U60810	4
9	1/2"x12" Lubrite Plate, 0'-12" Long	1
	FOLLOWING MATERIAL EXISTING IN FIELD BY ITT GRINNELL	
11	#18, "F" Fig.82, w/Travel Stops & Load Flange, Hot Load= 12,067#, Cold Load=14,024#	1
	HANGER ASSEMBLY SKETCH & ENGINEERING MARK# 2-MS-R95	1
12	1" x 12" HILTI KWIK	3
13.	1 1/2" x 18" x 18" C/S plate HT# 61551 APPLY DIVERSITY FOR POWER TO ALL ABOVE MATERIAL EXCEPT THREADS WHICH SHALL BE GREASED.	1
14.	1 1/2" X 12" HILTI KWIK	1

FCR# 2M-50156 Sheet 4 OF

FOR MATERIALS AND OPERATIONS SEE SKETCH NO 2-5094 REV 1

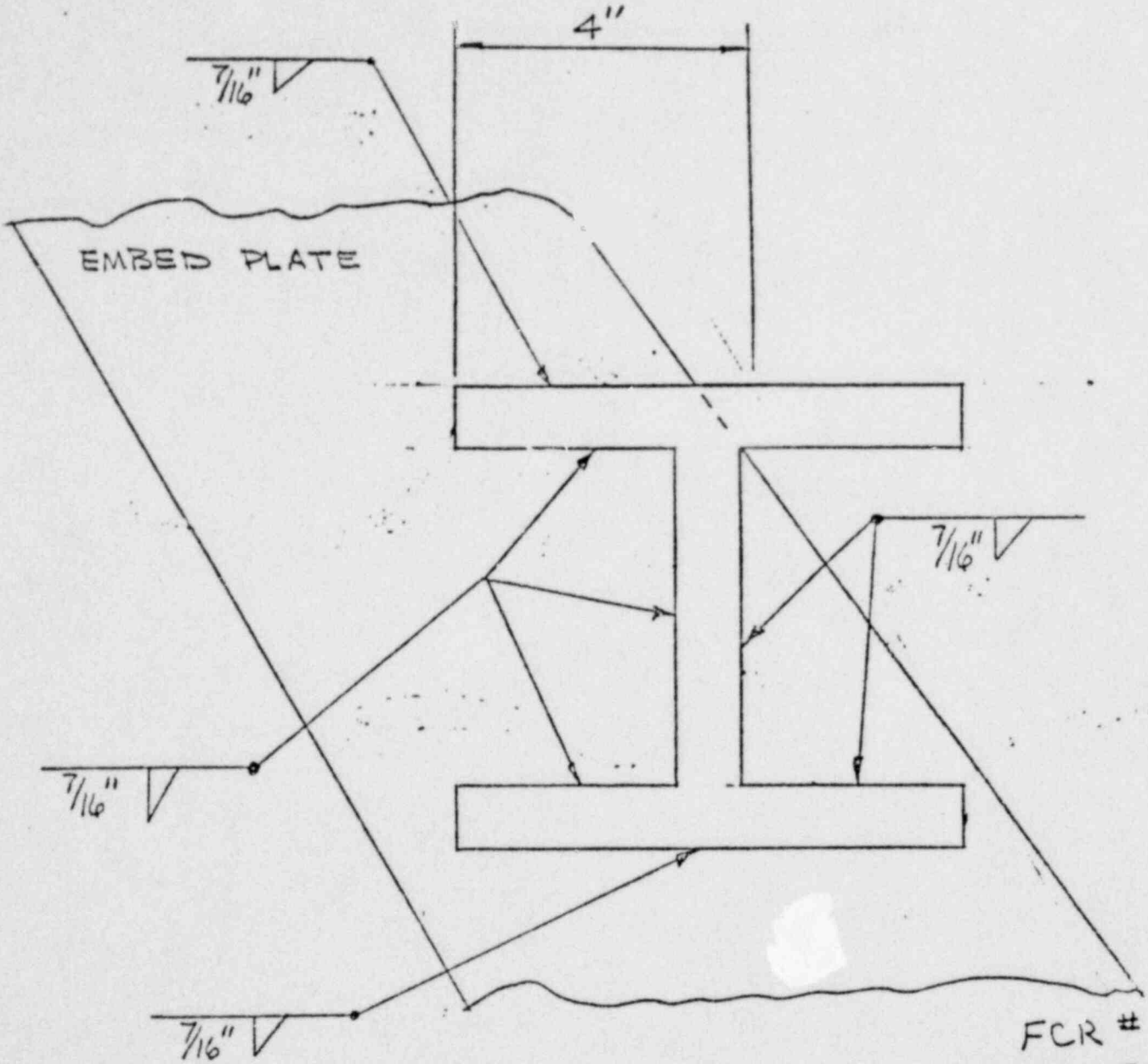
REF. DRW'G. NOS. PIPE D205300-4 STEEL D206215-2 MARK NO 2-MS-R95 SKETCH NO 2-5094B REV.

3 OF 4

VC

"ORIGINAL D.1

BOLT REV.



SECTION D-D

FCR # 2M-50156
SHEET 5 OF 9

D205300-4
D206215-2

2MS-R9S SKETCH 2-5094 ISO 2-3

4 OF 4

TEST DATA SHEET
WEDGE-TYPE CONCRETE ANCHORS

TW-185 (2-8-80)

Hanger I.D. No. 2MS-R95 Torque Wrench No. TW-185 (2-8-80)

U. T. Instrument No. 1174 U. T. Performed by/Date 11-30-79 Harper

Verified by/Date [signature] 12/4/79 Review/Date [signature] 12-14-79
QC Inspector Engineer

FCR's & CN's FCR # 2M-50156 SHEET 6 OF 9

** Mandatory QC Hold Point for Wej-it. * Mandatory QC Hold Point 12-5-79 All Wedge-Type

	Number	** 1	** 2	** 3	** 4	# 3	# 4		
Bolt Info	Type 12-5-79	Hilti	Hilti	Hilti	Hilti	Hilti	Hilti		
	Diamet CH. 84 (4-25-79) (in.) CH. 84 (4-25-80)	1"	1"	1"	1"	1"	1" w/Sprd		
	Length (in.)	12"	12"	12"	12"	12"	12"		
Plate Thickness		1½	1½	1½	1½	1½	1½		
Grout Thickness (in.)		N/A	—	—	—	—	—		
Leveling Nut Backed Off (Yes/NA)		N/A	—	—	—	—	—		
** Wedge Rod Grind Off Over ½" No/Actual Measurement Over ½"		N/A	—	—	—	—	—		
** Wedge Rods Flush		N/A	—	—	—	—	—		
* Nut Bottomed Out No/Threads Spoiled		NO	NO	yes	NO	YES	NO		
* Torque (ft.lbs.) LRW 11-30-79		325	325	TURNS IN H.T.	325		325		
Correct Nut Engagement		yes	yes		yes		yes		
Nut Flush (Yes/BW)		yes	yes		yes		yes		
Projection Above Plate (in.)		1 3/8	1 1/4		1 3/8		4 1/8		
Embedment		9 1/8	9 1/4		9 1/8		6 3/8		
Number Washers/Type		1 STD	1 STD	1 STD	1 STD	1 Plate Washer * 1 STD	1 STD		
Minimum Edge Distance Acceptable/See Sketch		ACC	ACC	ACC	ACC	ACC	ACC		
Minimum Bolt Spacing Acceptable/See Sketch		See SKETCH	See SKETCH	ACC	ACC	ACC	ACC		

(GROUTED PLATE)

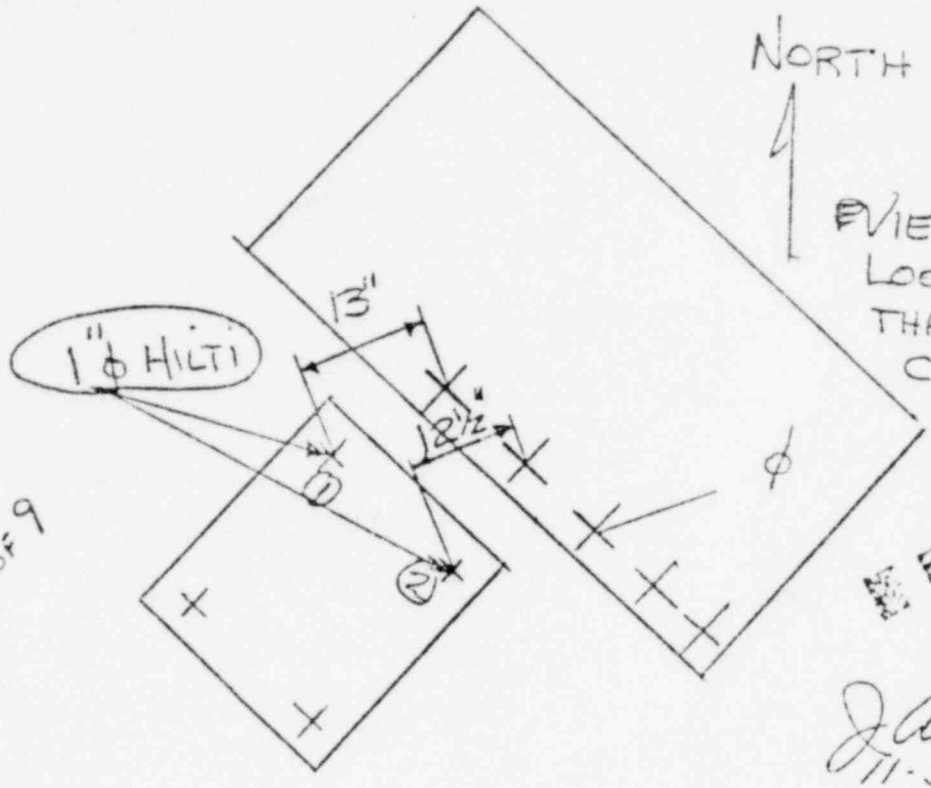
Embedment = bolt length - (projection + plate thickness + grout or space requiring grout).

* Plate WASHER NOT USED HT-9-4-89-69-3 QA Ltr. 12-5-79

(UNGROUTED PLATE)

Embedment = bolt length - projection above concrete

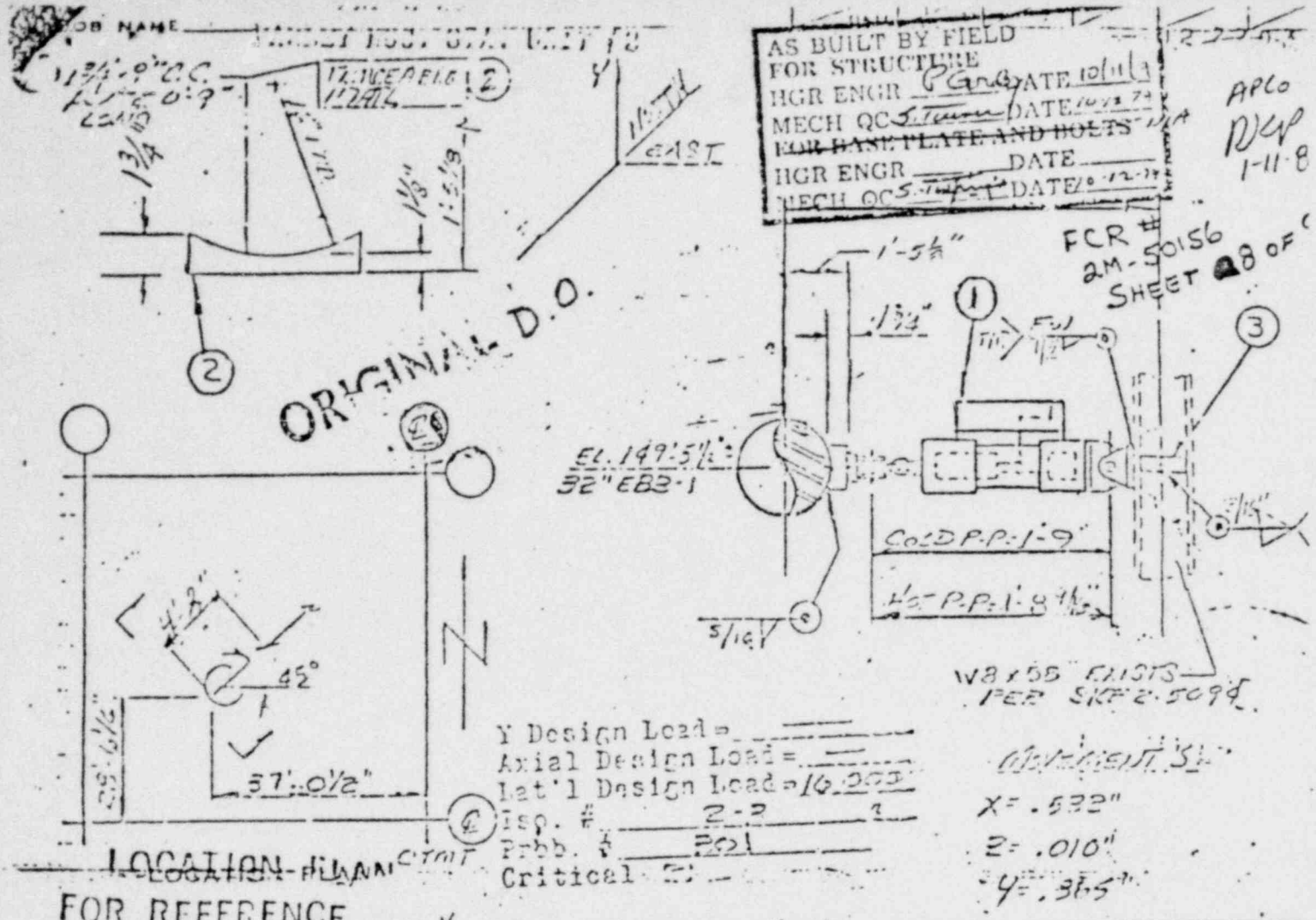
4½



FCR # 2M-50156
SHEET 7 of 9

J. Armstrong
11-30-79
Hanger Eng.

JOB NAME [illegible] UNIT 12



FOR REFERENCE [illegible]

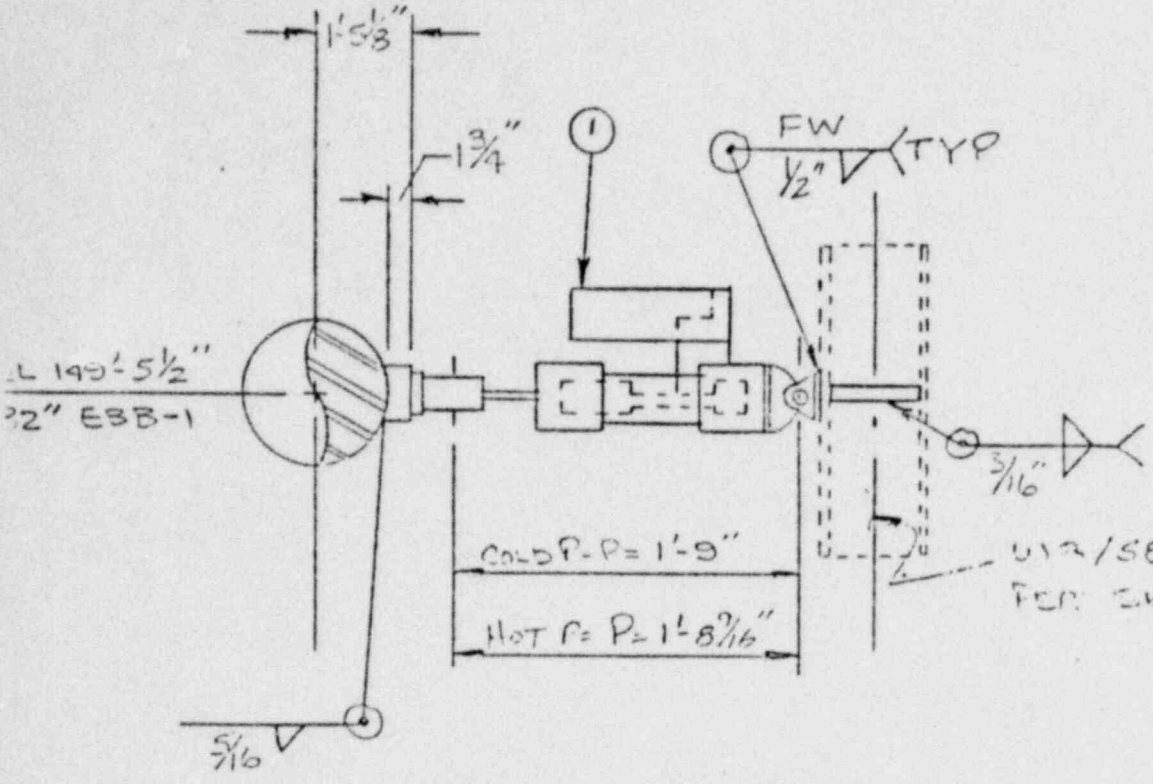
ITEM NO	MATERIALS AND OPERATIONS	QUAN.	SH
	SEISMIC SHOCK & SWAY SUPPRESSOR CONSISTING OF:	ONE	
	FOLLOWING MATERIAL BY ITT GRINNELL: EXISTING IN FIELD		
1	3 1/4" Cylinder, 5" Stroke, Fig. 200, Option #2 Hydraulic Shock & Sway Suppressor, Load=16,000#, Cold Piston Setting=4", Hot Piston Setting=4 3/8", w/Reservoir In Alternate Position	1	
	FOLLOWING MATERIAL BY D.C.C.A. EXISTING IN FIELD		
2	1 3/4"x9" Carbon Steel (SA515 GR.65) Plate, 0'-9" long Per Detail A, Traceability Required HT# 7484300	1	
	SEISMIC ASSEMBLY SKETCH & ENGINEERING	1	
	BUNDLE & TAG	1	
	MARK# 2-HS-R96		
	FOLLOWING MATERIAL FURNISHED BY D.C.C.A.		
3	1/4" x 3 1/2" C.S. STIFFNER PLATE 0'-5" LONG HT# 7489139-2	2	

FOR MATERIALS AND OPERATIONS SEE SKETCH NO _____ REV _____

REF. DRW'G. NOS. PIPE D-205300-4 STEEL D-206215-2 MARK NO. 2-HS-R96 SKETCH NO 2-5095 REV.

N11 SHT 1 OF 2

DF



FCR # 2M-50156
SHEET #9 of 9

ORIGINAL D.O

PIPE D 205300-4
STEEL D 206215-2

MK # 2-MS-R96 SKETCH # 2-5075 ISO 2-3
SHEET 2 OF 2

FIELD CHANGE REQUEST

FCR NO. 2M-50189

Joseph M. Farley Plant - Unit II
Field QC Procedure No. 5.3.2.1A
Drawing No.: N/A
Drawing Title: HANGER SKETCHES

Date 2/4/80
TPNS No. A17.07
Revision N/A
System ALL

Addressed to: APCO Construction - Attention J. A. MOONEY
Southern Services, Inc. - Attn.
Bechtel Corporation - Attention A. A. VIZZI
ITT Grinnell Corporation (Hanger Div.)

Originator: Michael Lindsey 2/5/80 PDE: T. Mussey

QCM L C Easterwood

Existing Condition:

THE FOLLOWING "AS BUILT" HANGER HAS BEEN FIELD VERIFIED PER NRC BULLETIN 79.14 GUIDELINES:

MARK NO.	ISO NO.	CV NO.	DANIEL REV.
2MS-R98	2-3	026	D.0

ABOVE HANGER IS PER 79.14 ONLY, NO BOLTS INVOLVED.

DANIEL CONSTRUCTION OF ALA. RECEIVED FEB 8 1980 DOCUMENT CONTROL

Recommended Action and Responsible Party: ATTEN: R. GANTI/BECHTEL

PLEASE APPROVE ATTACHED "AS BUILT" SKETCH.

URGENCY:
(1) Needed by ____ Noon (time) on 2/16/80 (date)
(2) Justification: 79.14 Completion

APCO APPLY:
Disposition Reference CR No.
QC Hold Tag No. (if applicable):
DISTRIBUTION: QC FOR SUSPENSE FILE, APCO QA FIELD REPRESENTATIVE, APCO NPD, ALL CONST. SUPERINTENDENTS

CUSTOMER

ORDER OR CONT. NO. FEP-2-29

FARLEY NUC. STA. UNIT #2

REV.	1	2	3	4	5
ENG					
DATE					

ORIGINAL D.O

U2 7703 (

5'-0"

EL 154'-6"

EL 153'-1 3/16"

W18×35 EXISTS

TYP. BOTH SIDE

EL 149'-7 3/8"
32"-EB3-1

TRACEABLE NATL

TRIM 2" OFF EAST EDGE

TYP BOTH ENDS

PIECE 13

EL 147'-3 7/16"

1" TYP

Field to * — Insure 2" clearance between ends of restraining arm and stanchion

APCO PLR 12-11-80

AS BUILT BY FIELD
FOR STRUCTURE
HGR ENGR _____ DATE 11-15-79
MECH QC _____ DATE 11-16-79
~~FOR BASH PLATE END BOLTS~~
HGR ENGR _____ DATE _____
MECH QC _____ DATE 11-11-79

W18×35
EL 157'-5"

99°45'

SECTION A-A

FCR 2M-50139
SHT 24 7

ANT'S
X .835'
Y .0'
Z -1.132'

DESIGN LOAD 33,000#
AXIAL DESIGN LOAD
LAT'L DESIGN LOAD
ISO 2-3
1'-3" WEST

LOCATION PLAN

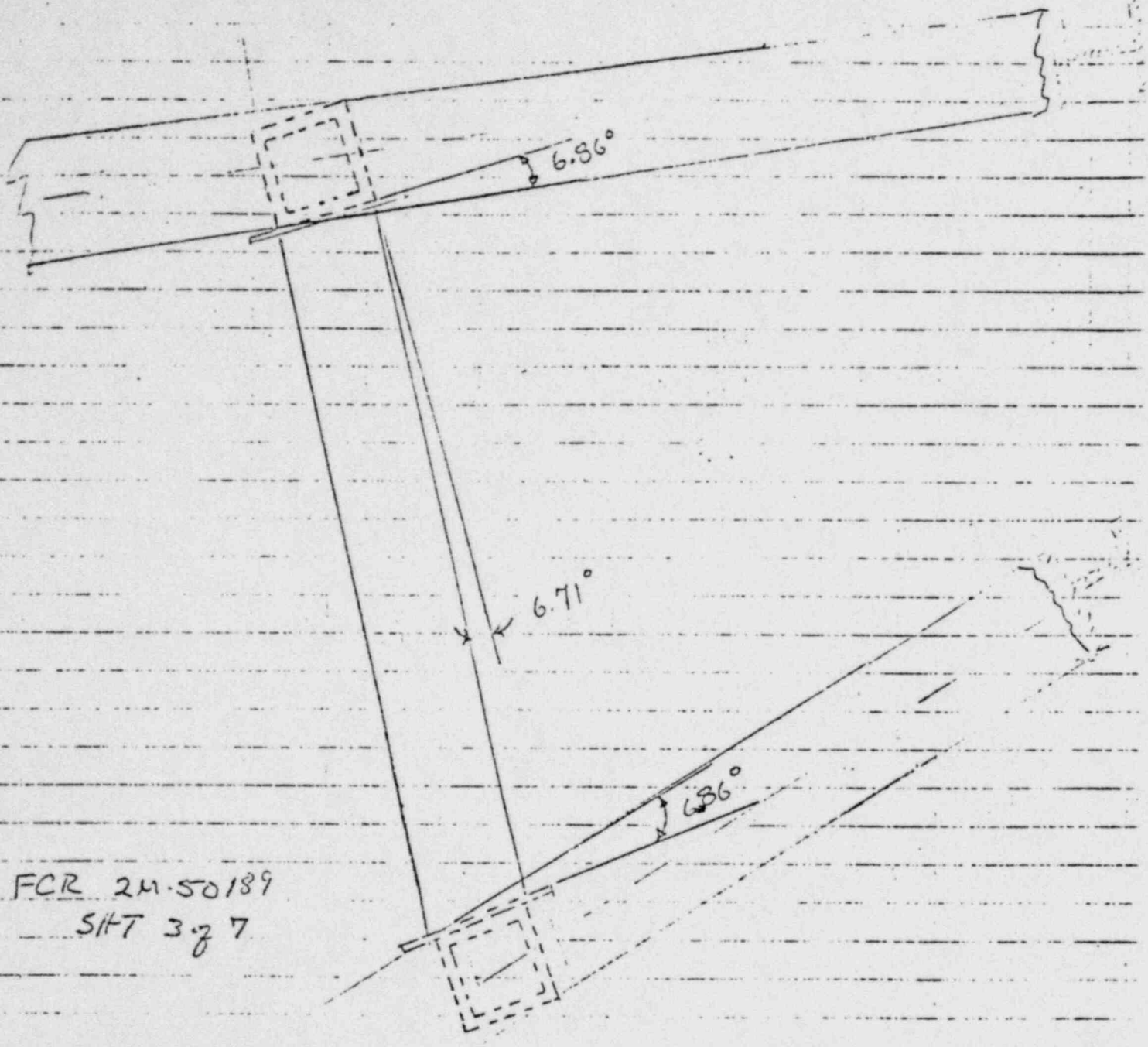
FOR REFERENCE ONLY
FOR MATERIALS AND OPERATIONS SEE SKETCH NO 2-5097B REV 1

PG (1)

REF. DRW'G. NOS. PIPE D25300-4
STEEL D-2067209-10
MARK NO 2-MS-R98
ISO 2-3
SKETCH NO 2-5097 REV.
SHEET 1 OF 6

ORIGINAL D.O

2M-50189



FCR 2M-50189
SHT 3 of 7

2MS-R98

REF. DWG.# D-205300-4 MARK# MS-R98 ISO.# 2-3
SHEET 2 OF 6

(2)

CUSTOMER

ORDER OR CONT. NO.

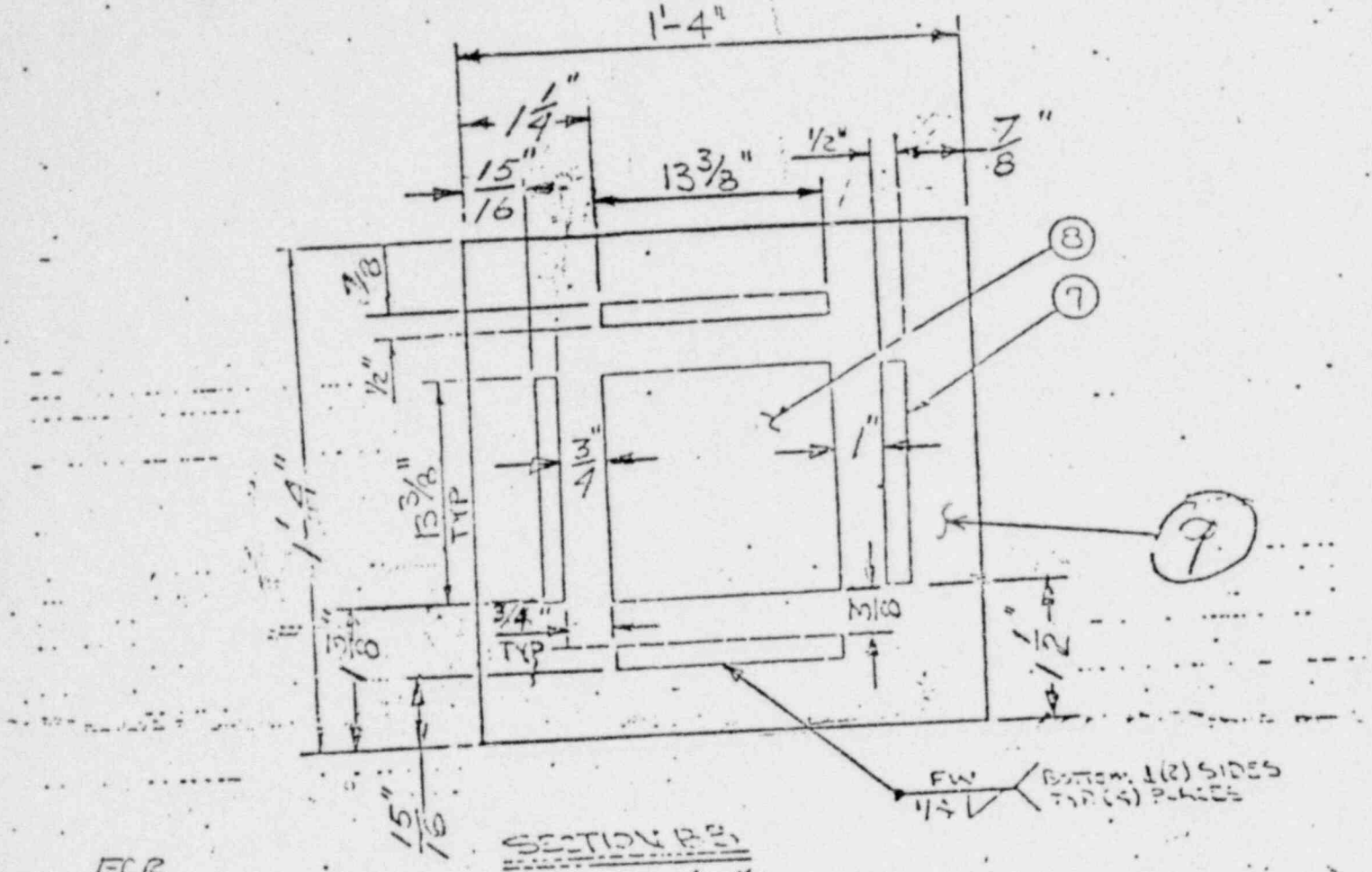
COD NAME

DRAWN BY: DATE:

REV.	1	2	3	4	5
CHG					
DATE					

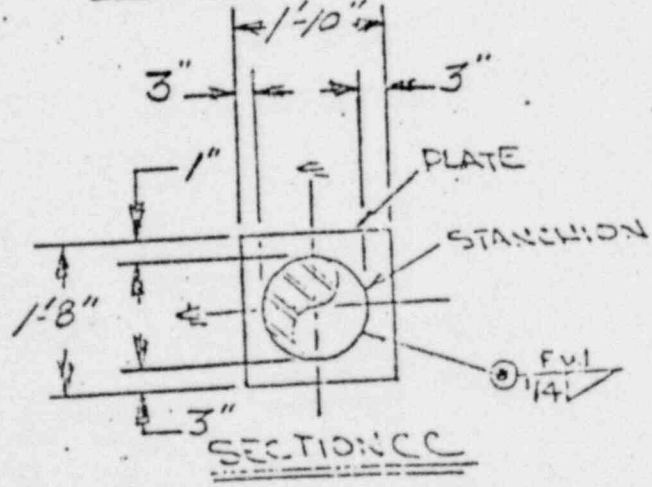
U27703

ORIGINAL D.O



FCR 2M-50189 SHT 4 & 7

SECTION B-B



SECTION C-C

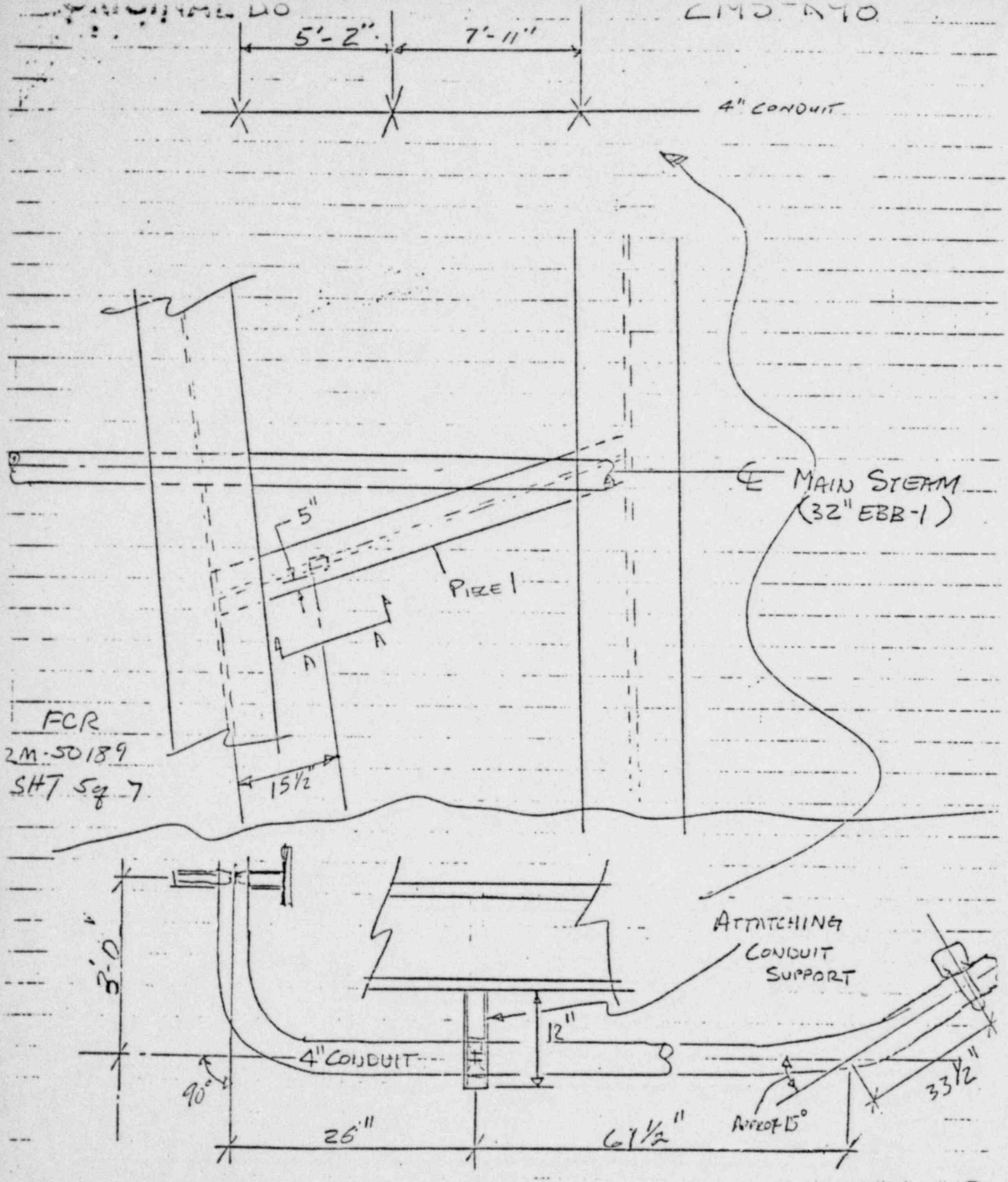
3

FOR MATERIALS AND OPERATIONS SEE SKETCH NO 2-5097B REV 1

PIPE D-205300-4 ISO.# 2-3 MARK NO 2-MS-R98

SKETCH NO 2-5097A

SHEET 3 OF 6



(4)

REF. DWG.# D-205300-4
MARK # 2-HS-R98

SECT A-A.

ISO. # 2-3
SKETCH # 2-5097

CUSTOMER [illegible]

ORDER OR CONT. NO. [illegible]

JOB NAME [illegible]

DRAWN BY [illegible] DATE [illegible]

REV.	1	2	3	4	5
ENG.	[illegible]				
DATE	[illegible]				

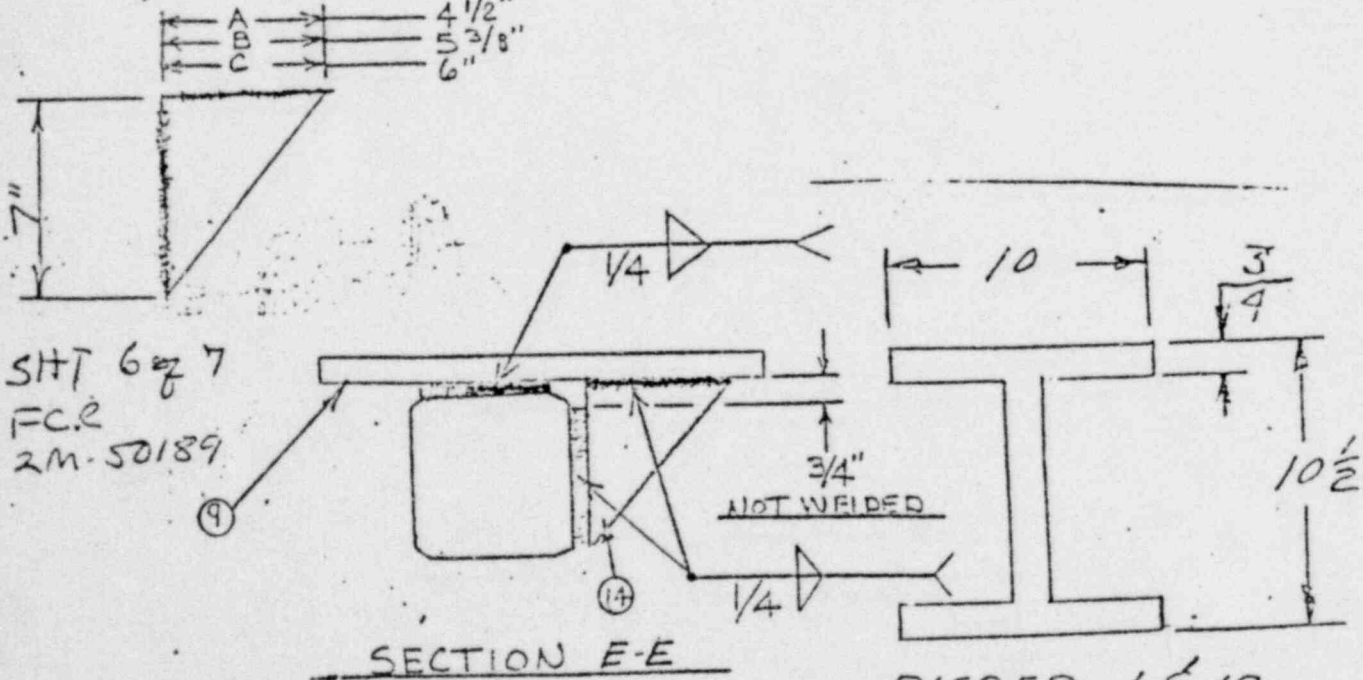
U2 770361

ONE

ORIGINAL D.O

SEISMIC PIPE SUPPORT CONSISTING OF:
ALL NEW MATERIAL REQUIRED BY D.C.C.A.

1	W10x72, 8'-8½" Long HT 66D834	1
2	1/2"x8"x8" T.S. 5'-9½" Long HT 07289 FIELD CUT	2
3	1/2"x10" Carbon Steel Plate, 0'-10" LONG HT 7477988	1
4	1/2"x8"x8" T.S. Long 4'-2½" HT 07289 FIELD CUT	1
5	Special H.S. 63, "C" Carbon Steel, 32" PIPE, 16" HT L 40877 Stanchion, D=1'-10¾" E=8½" Traceability Required	1
6	1/2"x1'-10" Carbon Steel Plate, 1'-8"-LONG HT 7420158	4
7	3/8"x ¾ Carbon Steel Bar, 0'-13 3/8" LONG HT 27563	1
8	1/2"x12" Lubrite Plate, 0'-12" LONG	1
9	1/2" X 1'-4" X 1'-4" CS PL. HT#7477988	
	SEISMIC ASSEMBLY SKETCH & ENGINEERING	1
	MARK# 2-MS-R9S	
10.	W10x72 7'-10" LONG HT 66D834	1
11.	¾" x 4" x 7" LG C.S. PLATE HT 7481111	1
12.	¾" x 2½" x 12½" C.S. PLATE. HT 7481111	1
13.	½" x 8"x 8" TS 5'-10¾" LONG HT07289	1
14.	½" x 7"x 4½" "A" C.S. GUSSETTS HT 7477988	1
	½" x 7 x 5 3/8" "B"	
	½" x 7 x 6 - "C"	



SHT 6 of 7
FCR 2M-50189

SECTION E-E

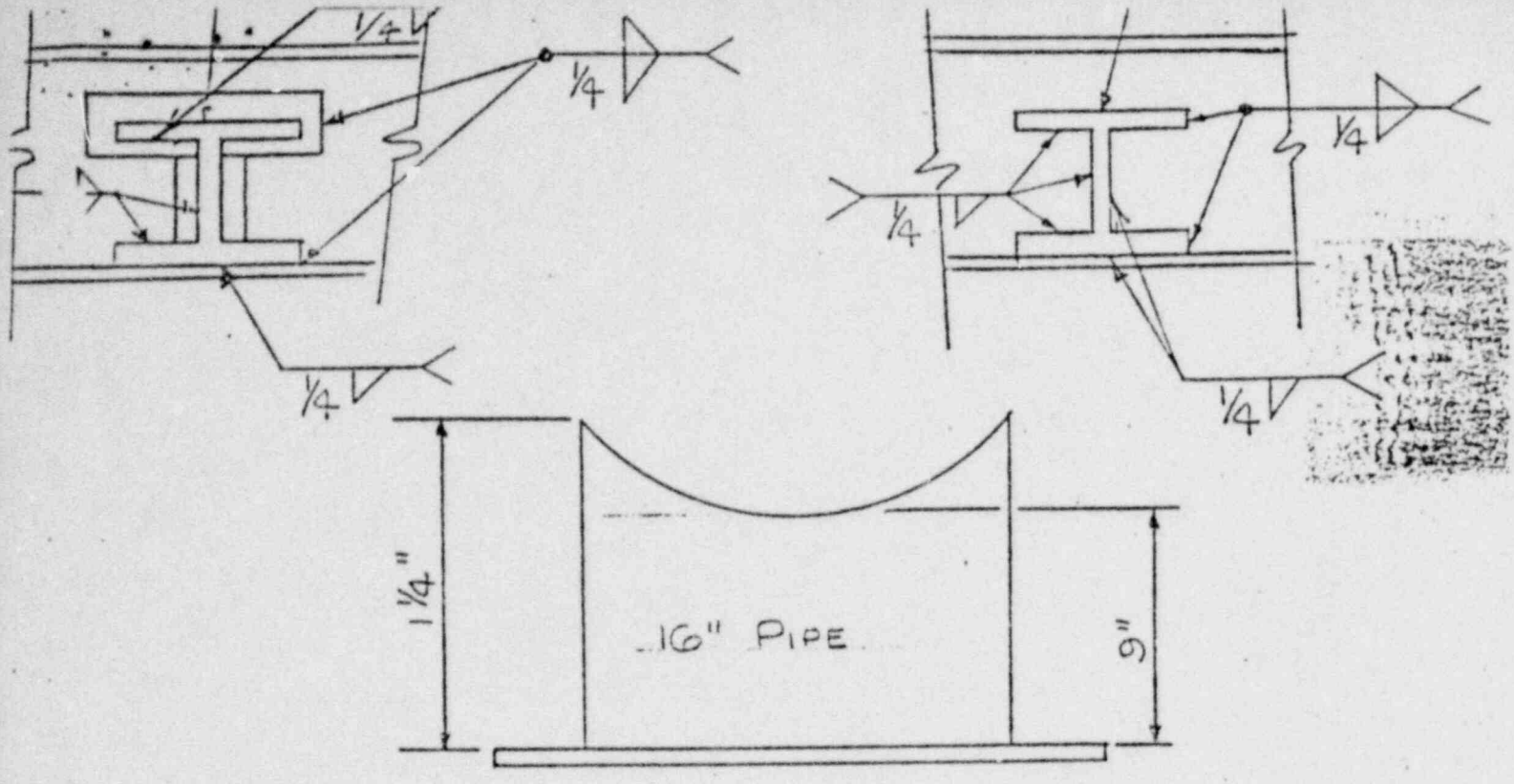
PIECES 1 & 10

(5)

FOR MATERIALS AND OPERATIONS SEE SKETCH NO 2-5097 REV 1

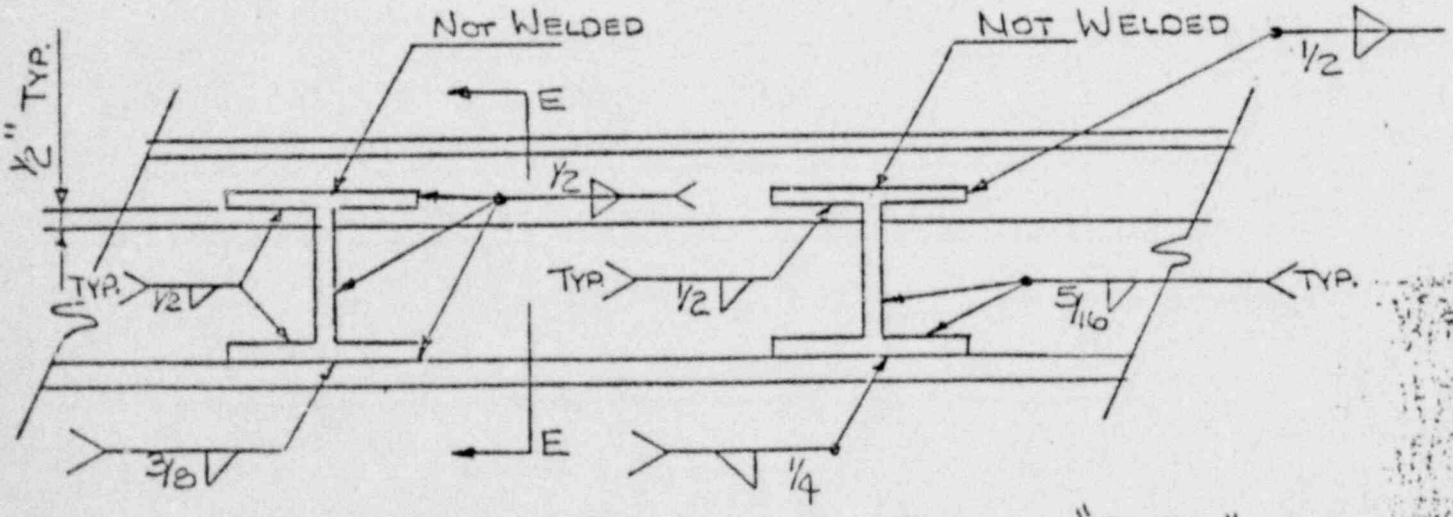
SEE DRWG NOS PIPE-D-205300-4 MARK NO 2-MS-R9S SKETCH NO 2-5097B

STEEL [illegible] ISO # 2-3 SHEET 5 OF 6

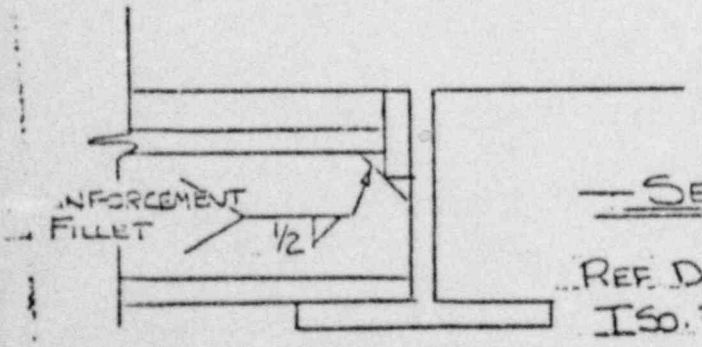


C/S STANCHION

FCR
2M-50189
SHT 7 of 7



SECTION "D-D"



SECTION "E-E"

REF. DWG.# D-205300-4 MARK # 2MS-R98
ISO. # 2-3 SKETCH # 2-5097 SHEET 6 OF (

FIELD CHANGE REQUEST

FCR NO. 2M-50190

Joseph M. Farley Plant - Unit II
Field QC Procedure No. 5.3.2.1A
Drawing No.: N/A
Drawing Title: HANGER SKETCHES

Date 2/23/80
TPNS No. A17.07
Revision N/A
System ALL

Addressed to: APCO Construction - Attention J. A. MOONEY
Southern Services, Inc. - Attn.
Bechtel Corporation - Attention A. A. VIZZI
ITT Grinnell Corporation (Hanger Div.)

Originator: [signature] PDE: [signature]

QCM [signature]

Existing Condition:

THE FOLLOWING "AS BUILT" HANGER HAS BEEN FIELD VERIFIED PER NRC BULLETIN 79.14 GUIDELINES:

MARK NO.	ISO NO.	CV NO.	DANIEL REV.
2MS-R99	2-3	026	D.0

ABOVE HANGER IS PER 79.14 ONLY, NO BOLTS INVOLVED.

Recommended Action and Responsible Party: ATTEN: R. GANTI/BECHTEL

PLEASE APPROVE ATTACHED "AS BUILT" SKETCH.

DANIEL CONSTRUCTION OF ALA. RECEIVED FEB 26 1980 DOCUMENT CONTROL

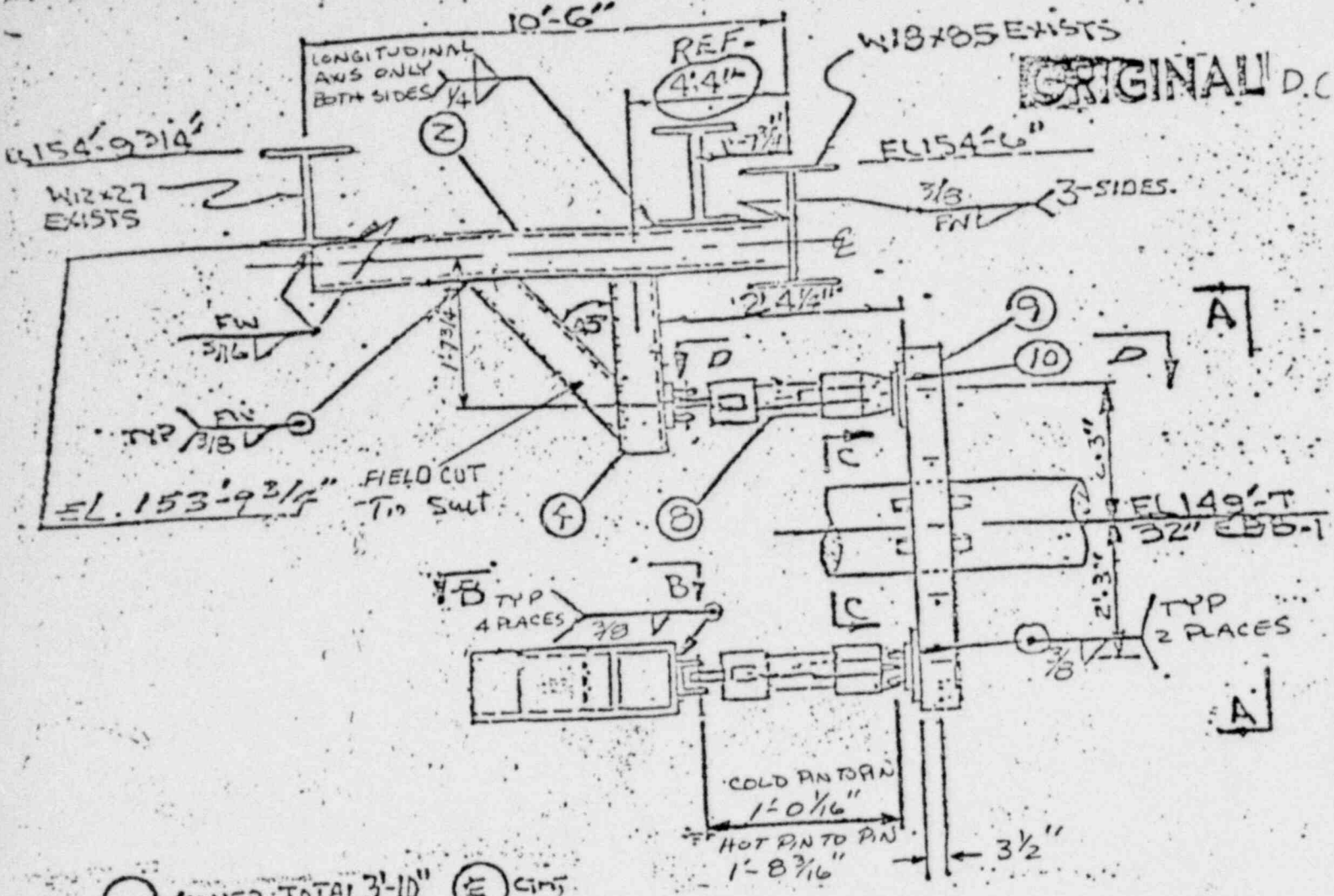
URGENCY:
(1) Needed by Noon (time) on 3/08/80 (date)
(2) Justification: 79.14 Completion

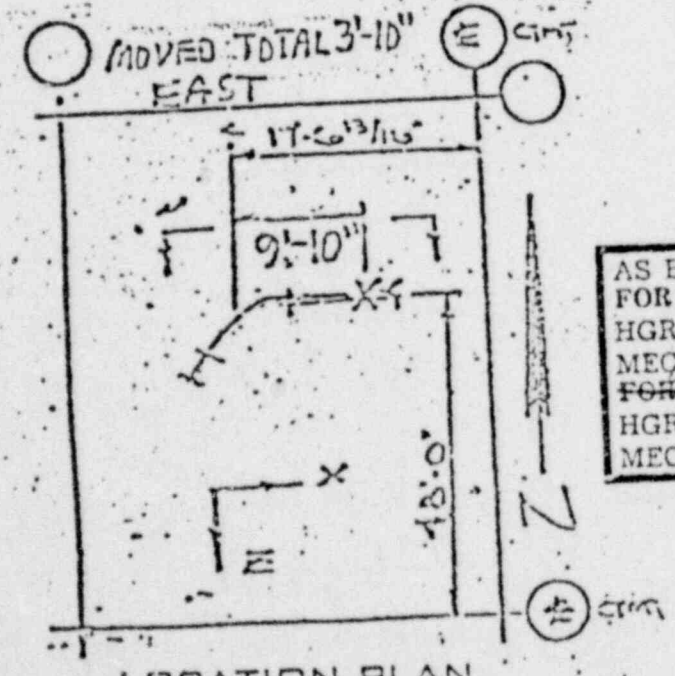
APCO NPD REPLY:
Disposition Reference CN No.
QC Hold Tag No. (if applicable):
DISTRIBUTION: DC FOR SUSPENSE FILE, APCO QA FIELD REPRESENTATIVE, APCO NPD, ALL CONST. SUPERINTENDENTS

JOB NAME

2M-50190

U27





REMOTE RESERVOIR TO BE INSTALLED AT A LATER DATE.

AS BUILT BY FIELD
FOR STRUCTURE
HGR ENGR DATE 2/19/2
MECH QC DATE
~~FOR DASH PLATE AND BOLTS~~ N/A
HGR ENGR DATE
MECH QC DATE

MOVEMENTS
X -.835"
Y 0"
Z -1.132"

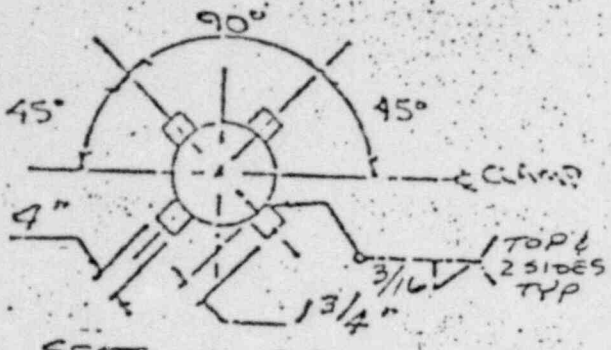
FCR# 2M-50190
SHEET 2 OF 4

ISO# 2-3

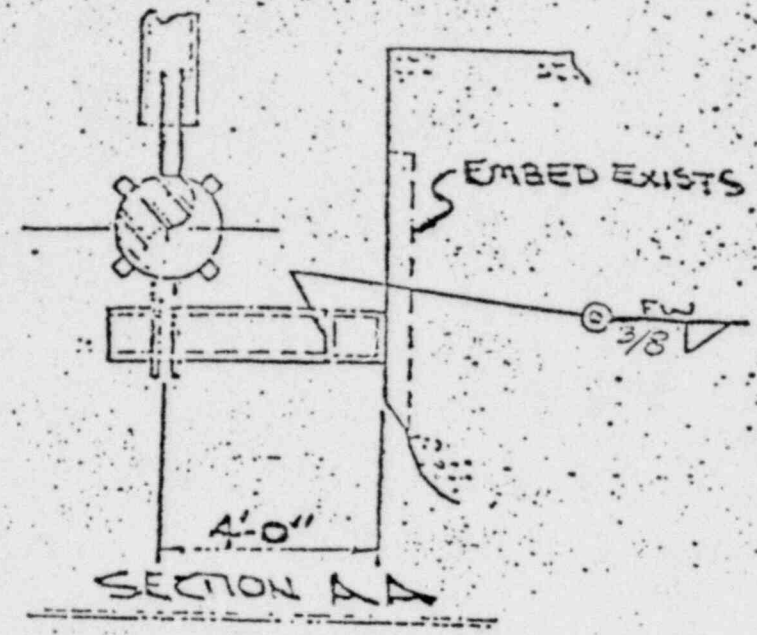
FOR MATERIALS AND OPERATIONS SEE SKETCH NO 2-5098A REV 1 SHT 1 OF 3

REF. DRW'G. NOS. PIPE D205300-4 STEEL D-20-229.6 MARK NO 2MS-R99 SKETCH NO 2-5098

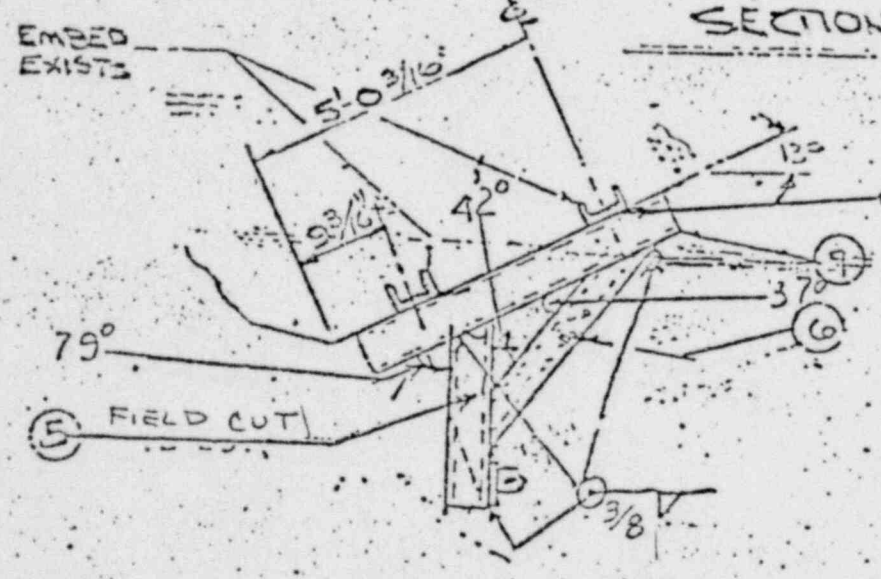
ORIGINAL - D.O. U2 77



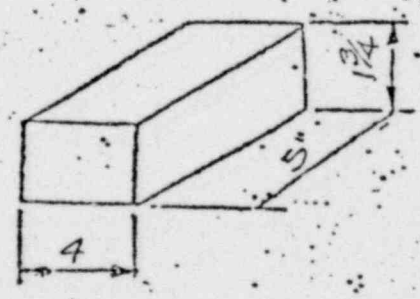
SECTION CC



SECTION AA



SECTION BB



DETAIL A (TYP)

FCR# 2M-50190

SHEET 3 OF 4

FOR MATERIALS AND OPERATIONS SEE SKETCH No 2-509BB REV 1

SHT 2 OF 3

REF. DRW'G. NOS. PIPE D-205300.4

STEEL D-206228-6 MARK NO 2-MS-P09 SKETCH No. 2-509BA

ORDER OR CONT. NO.

JOB NAME FARLEY NUC STA UNIT #2 2M 50190

ORIGINAL D.O. 12.77

SEISMIC HYDRAULIC SHOCK & SWAY SUPPRESSOR CONSISTING OF: ONE
FOLLOWING MATERIAL EXISTS IN FIELD BY D.C.C.A. 2G-9123

1	1 3/4"x4" Carbon Steel (SA515 GR.65) Lugs, 0'-5" Long /Detail A Traceability Required	8
7	1/2"x8"x8" T.S. 5'-7" Long H[illegible] HT-07289	1

FOLLOWING NEW MATERIAL REQUIRED BY D.C.C.A.

2	1/2"x8"x8" T.S. 10'-4 1/2" Long HT-07289	1
3	1/2"x8"x8" T.S. 2'-4[illegible]" Long HT-07289	1
4	1/2"x8"x8" T.S. 1'-8 1/4" Long HT-07289	1
5	1/2"x8"x8" T.S. 4'8" Long HT-07289	1
6	1/2"x8"x8" T.S. 3'10" Long HT-07289	1

FOLLOWING MATERIAL EXISTS IN FIELD BY ITT GRINNELL

9	H.S. 40 "A" Carbon Steel (A515 GR.65) 32" O.D. Pipe Developed Length/Half Clamp=6'-8 3/8", E=2'-3", F(inner studs)=1 3/8"x9 3/4", F(load studs)=1 3/4"x10 1/2", G= 1 3/4"x12", S=3", K=1'-2 1/2", A=4 1/4", TW=1005#	1
8	3 1/4" Cylinder, 5" Stroke, Fig. 200, Option #2, Hydraulic Shock & Sway Suppressor, Load=11,000#, Cold Piston Setting=4 1/16", Hot Piston Setting=3 3/16"/PH-74 w/manifold arrangement, SK.# BH-1230 w/rear pivot mount rotated 90° - REMOTE RESERVOIR TP 5/12/8	2

SEISMIC ASSEMBLY SKETCH & ENGINEERING
MARK# 2-HS-R99

10	1"x 7" x 5 1/2 C.S. PLATE HT-742075G	

APPLY ONE COAT OF PRIMER TO ALL ABRADED MATERIAL
DAMAGED SURFACES WHICH SHALL BE PRIMED.

FCR# 2M-50190
SHEET 4 OF 4

FOR MATERIALS AND OPERATIONS SEE SKETCH NO 2-509B REV 1 SHT 3 OF

REF. DRW'G. NOS. PIPE D-205-300(4) STEEL D-2[illegible]228(6) MARK NO 2-HS-R99 SKETCH NO 2-5098F

FIELD CHANGE REQUEST

FCR NO. 2M-50199

Joseph M. Farley Plant - Unit II
Field QC Procedure No. 5.3.2.1A
Drawing No.: N/A
Drawing Title: HANGER SKETCHES

Date 2/23/80
TPNS No. A17.07
Revision N/A
System ALL

Addressed to: APCO Construction - Attention J. A. MOONEY
Southern Services, Inc. - Attn.
Bechtel Corporation - Attention A. A. VIZZI
ITT Grinnell Corporation (Hanger Div.)

Originator: J Gabbiselli 2/25/80 PDE: T. Massey

QCM L C Eastwood

Existing Condition:

THE FOLLOWING "AS BUILT" HANGER HAS BEEN FIELD VERIFIED PER NRC BULLETIN 79.14 GUIDELINES:

MARK NO.	ISO NO.	CV NO.	DANIEL REV.
2MS-612	2-3	026	D.1

ABOVE HANGER TESTED PER NRC BULLETIN 79.02 GUIDELINES AND INFORMATION IS INCLUDED.

Recommended Action and Responsible Party: ATTEN: R. GANTI/BECHTEL

PLEASE APPROVE ATTACHED "AS BUILT SKETCH.

RECEIVED FEB 29 1980 DOC. CONT. 03/20

DANIEL CONSTRUCTION OF ALA. RECEIVED FEB 26 1980 DOCUMENT CONTROL

URGENCY:
(1) Needed by Noon (time) on 3/08/80 (date)
(2) Justification: 79.14 and 79.02 Completion

APCO NPD REPLY:
Disposition Reference CN No.
QC Hold Tag No. (if applicable):
DISTRIBUTION: QC FOR SUSPENSE FILE, APCO QA FIELD REPRESENTATIVE, APCO NPD, ALL CONST. SUPERINTENDENTS

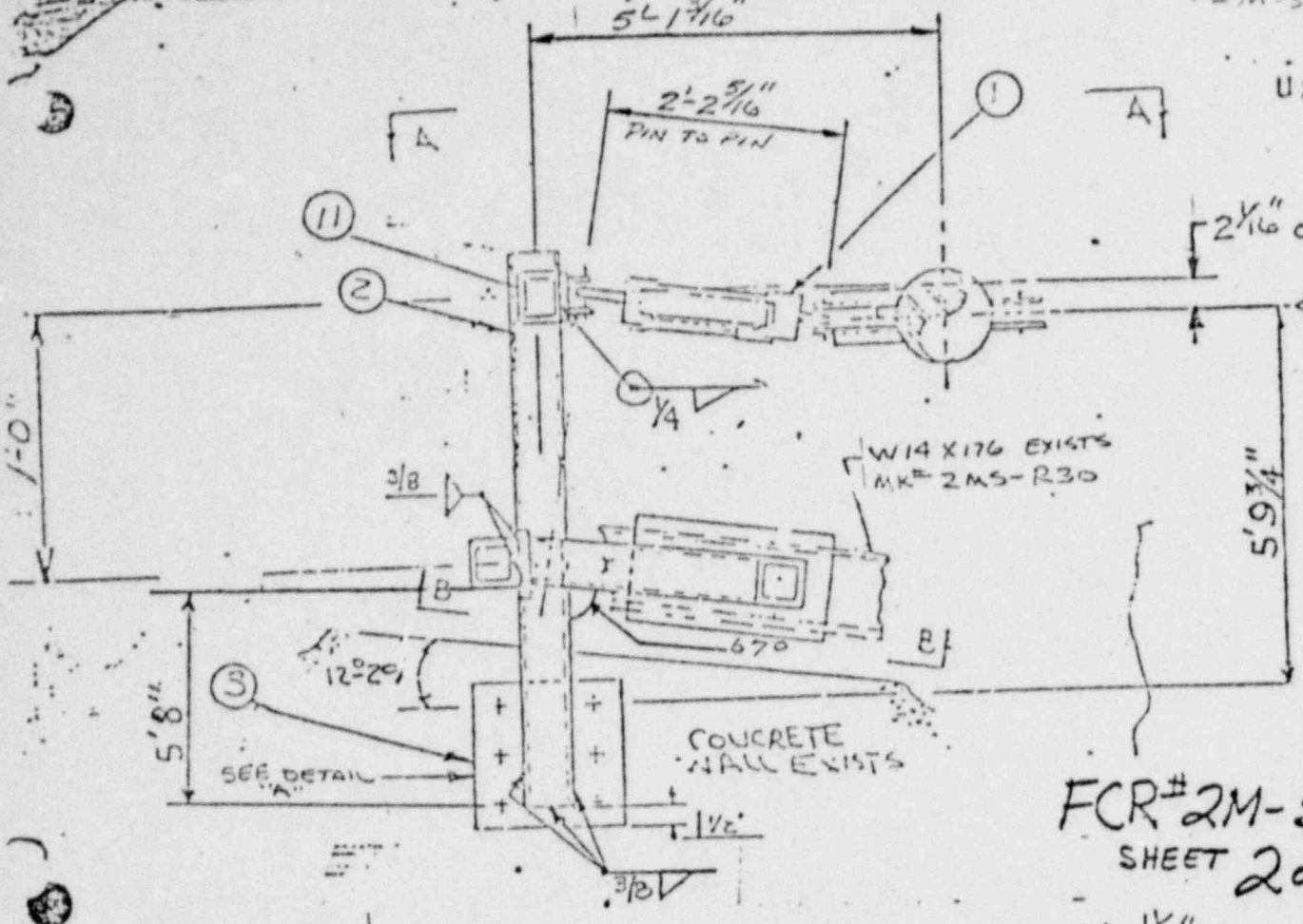
CONT. NO.

NAME

REV.	1	2	3	4	5
ENG					
DATE					

2M-50199

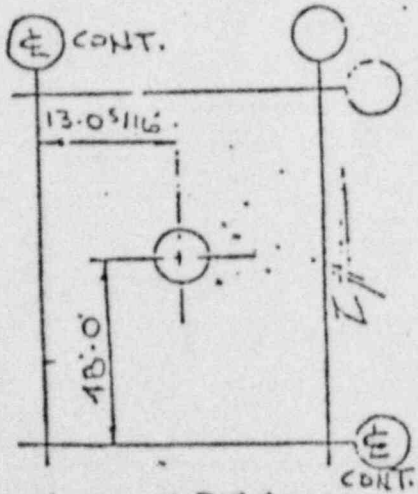
U2770364

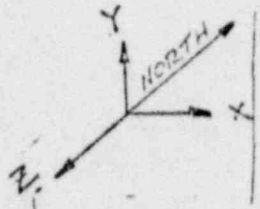


FCR# 2M-50199
SHEET 2 OF 6

PLAN VIEW AT ELEVATION 167'-2 11/16"

AS BUILT BY FIELD
FOR STRUCTURE
HGR [illegible] DATE 2/18/00
MECH QC R. Hall DATE 2-20-80
FOR BASE PLATE AND BOLTS
HGR [illegible] DATE 2/18/00
MECH QC R. Hall DATE 2-20-80





MVATS-
X 1.57.8'
Y .80'
Z 492.03'0

DESIGN LOAD
AXIAL DESIGN LOAD
E-W LAT'L DESIGN LOAD 35.000#
ISO # 2-3
PIPE # 501
CRITICAL A-6

** 0'-11 5/8" UP.

LOCATION PLAN
FOR REFERENCE ONLY

ORIGINAL STRUCT. REV. D. 1.

FCR-2M-50199
SHT 2 OF 6

FOR MATERIALS AND OPERATIONS SEE SKETCH NO. 2-5611 A REV 1

REF. DRW'G. NOS. PIPE D205300
STEEL
MARK NO. 2-MS-R612 SKETCH NO. 2-5611 REV

EK-1111-CV-026

10 OF 4

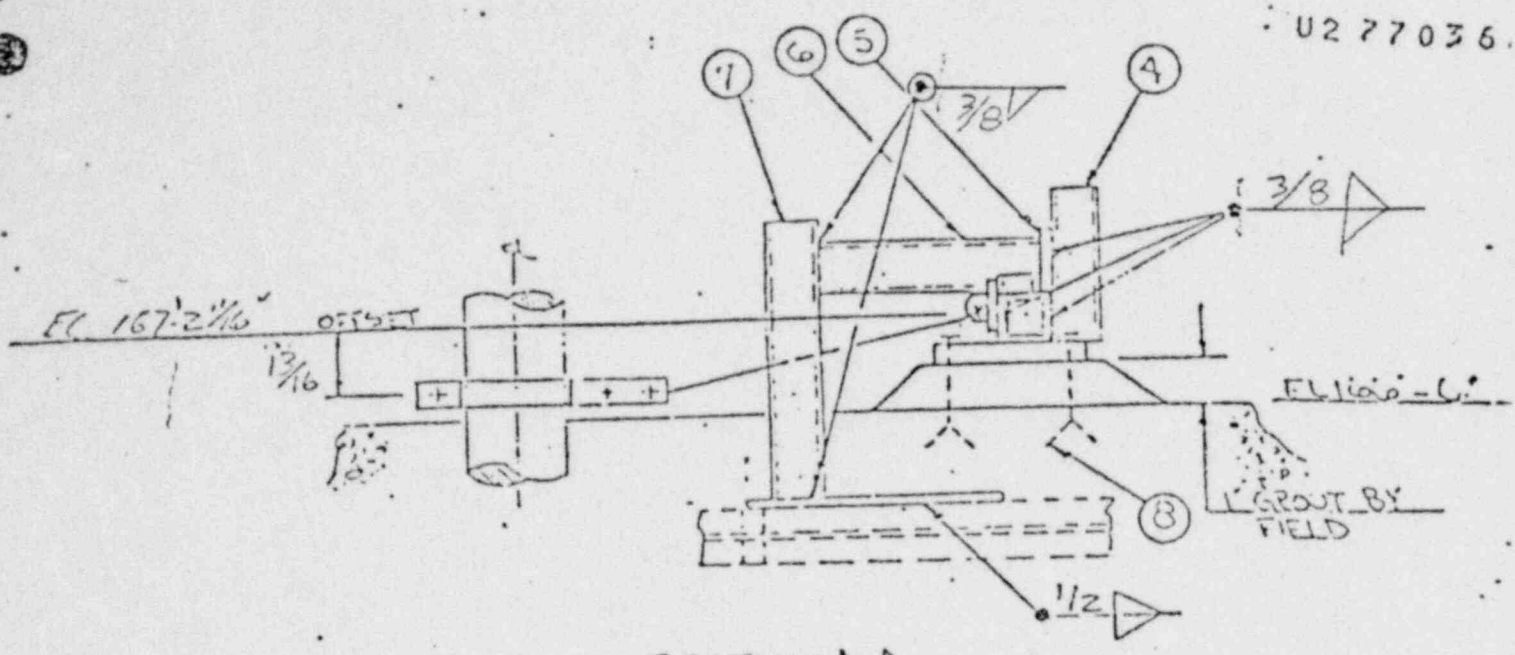
ON CONT. NO. T.S.-2-39

NAME TAYLOR MFG. CO., UNIT 52

	1	2	3	4	5
ENG. / DATE					

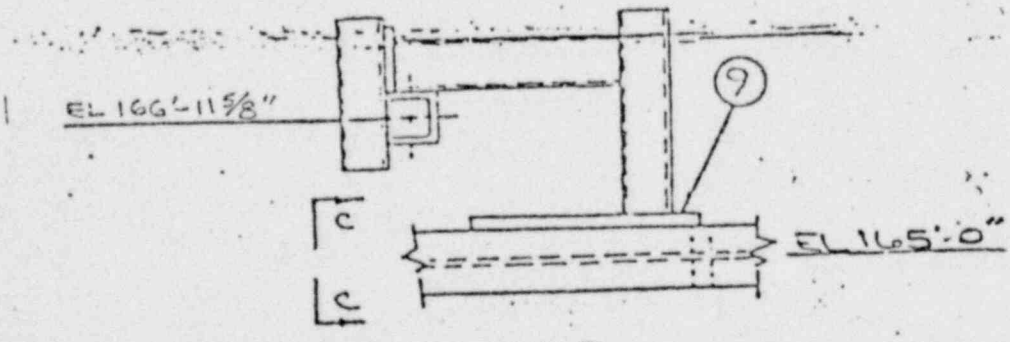
2M 50199

U2 77036.



SECTION AA

FCR# 2M-50199
SHEET 3 OF 6



SECTION BB

ORIGINAL D.1.
STRUCT. REV.

FCR
2M-50199
SHT 3 OF 6

FOR MATERIALS AND OPERATIONS SEE SKETCH NO. 2-5611B REV. 1

REF. DRW'G. NOS. PIPE ____ STEEL ____ MARK NO. 2-MS-PG12 SKETCH NO. 2-5611A REV

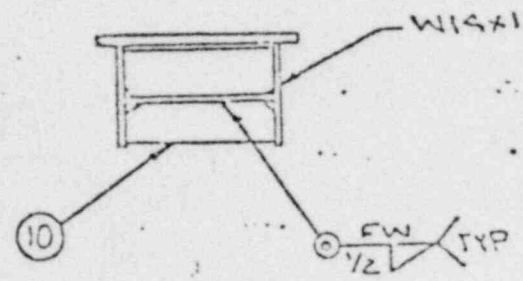
2 OF 4

REDRAWN BY D.L. DATE [illegible]

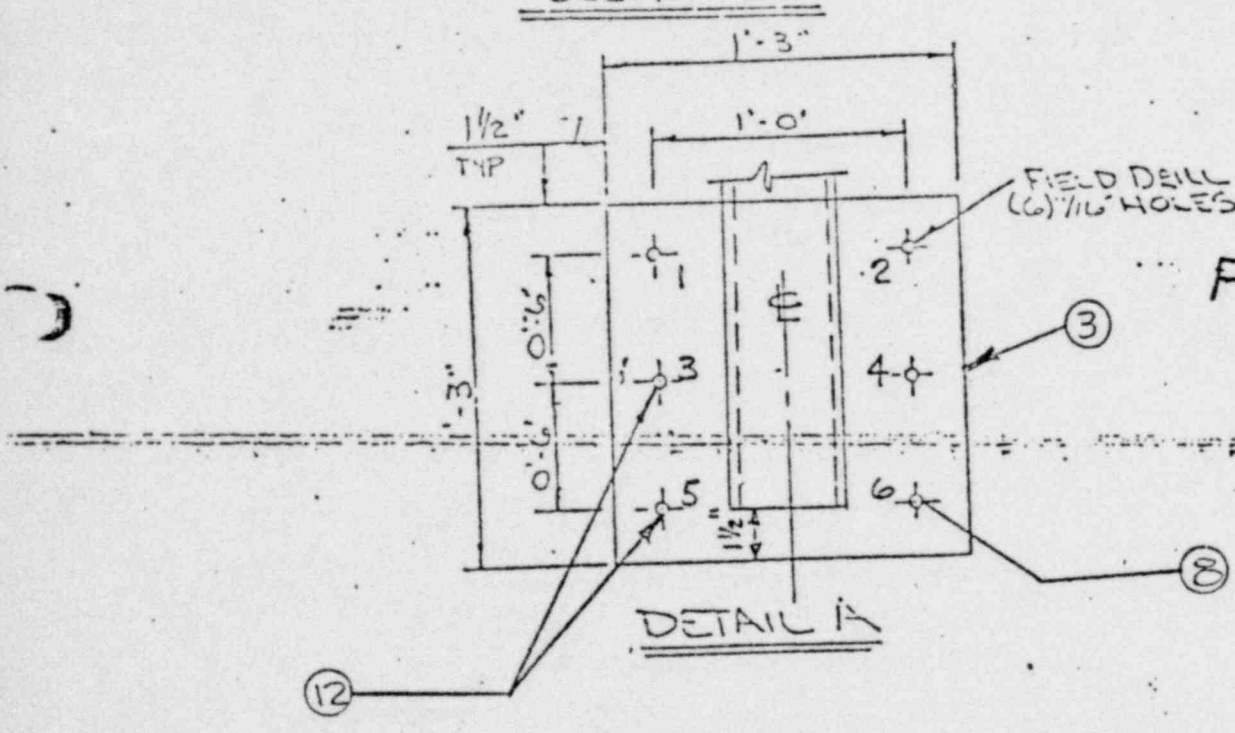
REV.	1	2	3	4	5
ENG / DATE	[illegible]				

2M-50199

U2770364



SECTION CC



FCR# 2M-50199
SHEET 4 OF 6

ORIGINAL D.1.
STRUCT. REV.

FCR 2M-50199
SHT 4 OF 6

FOR MATERIALS AND OPERATIONS SEE SKETCH NO. 2-5611C REV. 1

REF. DRW'G. NOS. PIPE — STEEL — MARK NO. 2-MS-R612 SKETCH NO. 2-5611B REV

3 OF 4

OH CONT. No. [illegible]

NAME [illegible]

CHECK BY [illegible] DATE [illegible]

DRAWN BY [illegible] DATE 12-17-77

REV.	1	2	3	4	5
ENG DATE					

2M-50199

U2770364

SEISMIC HYDRAULIC SHOCK & SWAY SUPPRESSOR CONSISTING OF: ONE FOLLOWING MATERIAL EXISTING IN FIELD BY ITT GRINNELL

1 5" Cylinder, 5" Stroke, Fig.200, Option #3, 32" O.D. Pipe, Carbon Steel, Hydraulic Shock & Sway Suppressor Load=35,000#, Cold Piston Setting=3 5/8", Hot Piston Setting=5 1/16" 7PH-74 — 1

FOLLOWING MATERIAL EXISTING IN FIELD BY D.C.C.A.

2 1/2"x8"x8" T.S. 7'-4" Long HT#07289 — 1
3 5/8"x1'-3" Carbon Steel Plate, 1'-3" Long HT#5471296 — 1
8 5/8"x6 1/2" Hilti Kwik Bolt, Concrete Anchors — 4

FOLLOWING NEW MATERIAL REQUIRED BY D.C.C.A.

4 1/2"x8"x8" T.S. 1'-7" Long HT#07289 — 1
5 1/2"x10" Carbon Steel Plate, 0'-10" Long HT-X01135 — 1
6 1/2"x8"x8" T.S. 5'-7¼" Long HT-80677 — 1
7 1/2"x8"x8" T.S. 2'-3" Long HT-07289 — 1

10 1"x7" Carbon Steel Stiffener Plate, 1'-0 1/2" LG, HT-7411806 — 1
11 ½"x6"x6" T.S. 0'-4" LG HT#804059 — 1

SEISMIC ASSEMBLY SKETCH & ENGINEERING MARK# 2-MS-R612

9 1'x1'-1¼"c/s R 2-1¼" LG HT#7411806

12. 5/8"x6" HILTI KWIK BOLT, CONCRETE ANCHORS 2

D.1.

ORIGINAL STRUCT. REV.

APPLY DIFFERENCE B.O. CREDIT TO ALL ABOVE MATERIAL EXCEPT THOSE MARKED STRUCT. REV.

FCR 2M-50199 6 OF 6

FCR#2M-50199 SHEET 5 OF 6

FOR MATERIALS AND OPERATIONS SEE SKETCH No. 2-5611 REV. 1

REF. DRW'G. Nos. PIPE D205300 STEEL — MARK No. 2-MS-R612 SKETCH No. 2-5611C REV. 1

4 OF 4

FC

FCR
2m-50199
SHT 65 of 96

Field Quality Control
Procedure No. 5.4.2.1A

TEST DATA SHEET
WEDGE-TYPE CONCRETE ANCHORS

Hanger I.D. No. 2MS-R612 Torque Wrench No. TW 177 (2-12-80)

U. T. Instrument No. 0104 U. T. Performed by/Date Hopp 12-18-79

Verified by/Date Mike Sullivan 12-19-79 Review/Date J. Armstrong 1-7-80
QC Inspector Engineer

FCR's & CN's

** Mandatory QC Hold Point for Wei-it. * Mandatory QC Hold Point for All Wedge-Type

		Number	1	2	3	4	5	6		
	Bolt Info	Type	Hilti	—	—	—	—	—		
		Diameter (in.)	5/8"	5/8"	5/8"	5/8"	5/8"	5/8"		
		Length (in.)	6 1/2	6 1/2	6	6 1/2	6	6 1/2		
	Plate Thickness		5/8"	5/8"	5/8"	5/8"	5/8"	5/8"		
	Grout Thickness (in.)		1 1/8"	1 1/8"	1 1/8"	1 1/8"	1 1/8"	1 1/8"		
	Leveling Nut Backed Off (Yes/NA)		N/A	—	—	—	—	—		
**	Wedge Pod Grind Off Over 1/2" No/Actual Measurement Over 1/2"		N/A	—	—	—	—	—		
**	Wedge Rods Flush		N/A	—	—	—	—	—		
*	Nut Bottomed Out No/Threads Spoiled		NO	NO	NO	NO	NO	NO		
*	Torque (ft.lbs.)		100	100	100	100	10	100		
	Correct Nut Engagement		yes	yes	yes	yes	yes	yes		
	Nut Flush (Yes/NA)		yes	yes	yes	yes	yes	yes		
	Projection Above Plate (in.)		7/8"	13/16"	7/8"	15/16	1"	13/16"		
	Embedment		3 7/8"	3 15/16"	3 3/8"	3 13/16"	3 1/4"	3 15/16"		
	Number Washers/Type		1 STD	1 STD	1 STD	1 STD	1 STD	1 STD		
	Minimum Edge Distance Acceptable/See Sketch		Acc.	Acc.	Acc.	Acc.	Acc.	Acc.		
	Minimum Bolt Spacing Acceptable/See Sketch		Acc.	Acc.	Acc.	Acc.	Acc.	Acc.		

(GROUTED PLATE)

Embedment = bolt length - (projection + plate thickness + grout or space requiring grout).

(UNGROUTED PLATE)

Embedment = bolt length - projection above concrete

FIELD CHANGE REQUEST

FCR NO. 2M-50200

Joseph M. Farley Plant - Unit II
Field QC Procedure No. 5.3.2.IA
Drawing No.: N/A
Drawing Title: HANGER SKETCHES

Date 2/23/80
TPNS No. A17.07
Revision N/A
System ALL

Addressed to: APCO Construction - Attention J. A. MOONEY
Southern Services, Inc. - Attn.
Bechtel Corporation - Attention A. A. VIZZI
ITT Grinnell Corporation (Hanger Div.)

Originator: [signature] 2/20/80 PDE: T. Massey

QCM [signature]

Existing Condition:

THE FOLLOWING "AS BUILT" HANGER HAS BEEN FIELD VERIFIED PER NRC BULLETIN 79.14 GUIDELINES:

MARK NO.	ISO NO.	CV NO.	DANIEL REV.
2MS-R613	2-3	026	D.0

ABOVE HANGER IS PER 79.14 ONLY, NO BOLTS INVOLVED.

Recommended Action and Responsible Party: ATTEN: R. GANTI/BECHTEL

PLEASE APPROVE ATTACHED "AS BUILT" SKETCH.

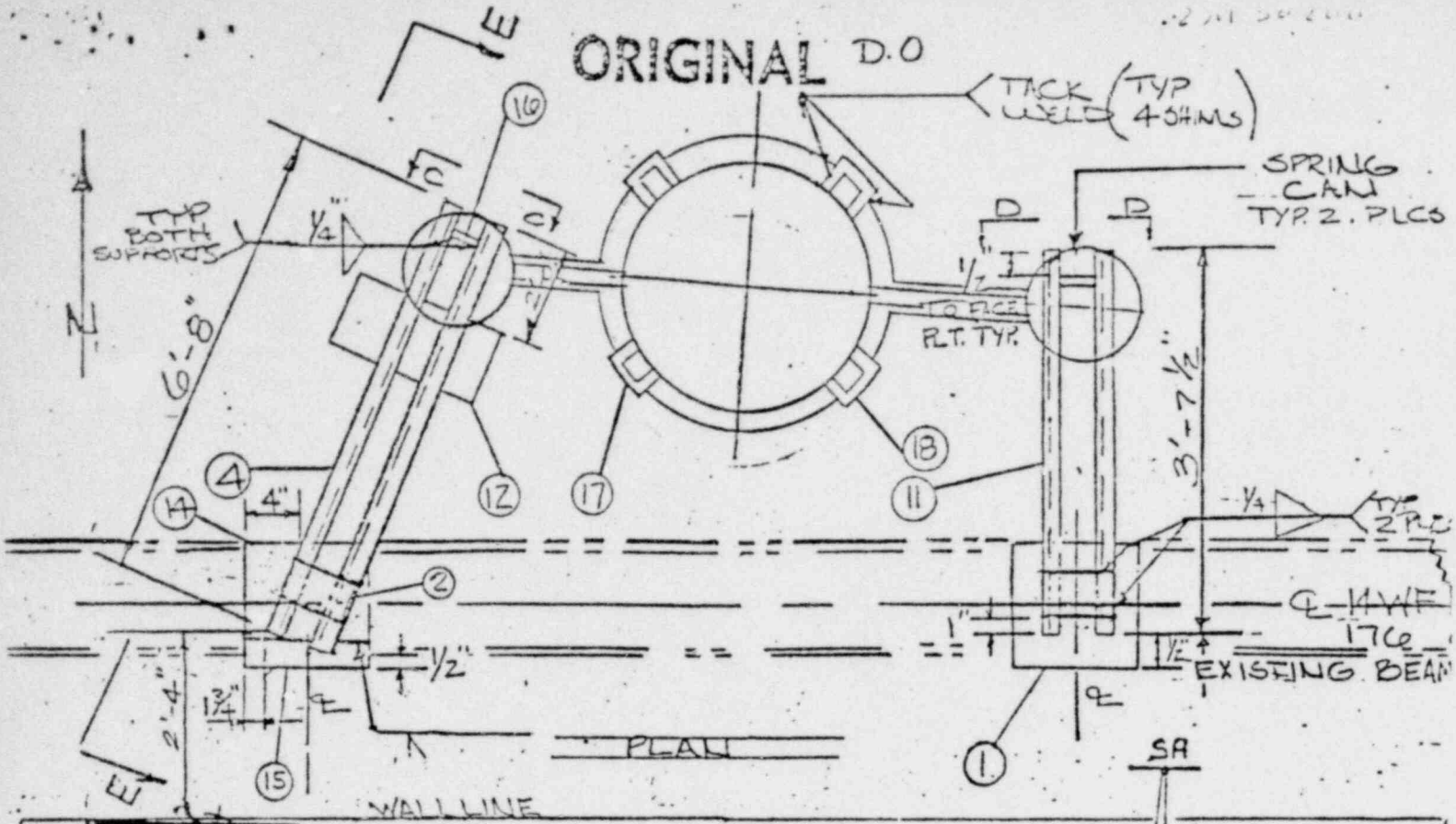
URGENCY:
(1) Needed by Noon (time) on 3/08/80 (date)

(2) Justification: 79.14 Completion

APCO NPD REPLY:
Disposition Reference CN No.
QC Hold Tag No. (if applicable):

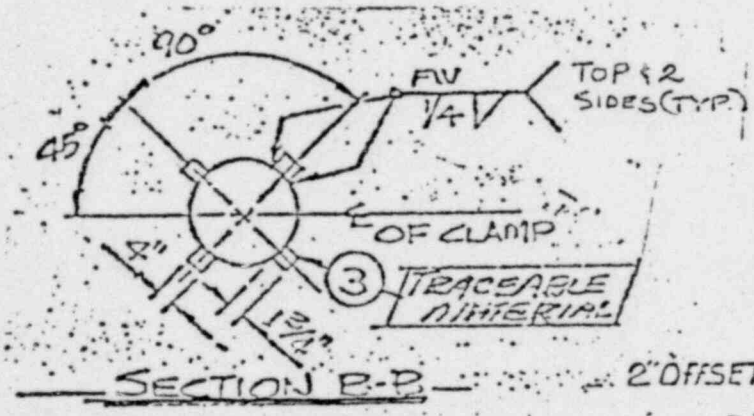
DISTRIBUTION: DC FOR SUSPENSE FILE, APCO QA FIELD REPRESENTATIVE, APCO NPD, ALL CONST. SUPERINTENDENTS

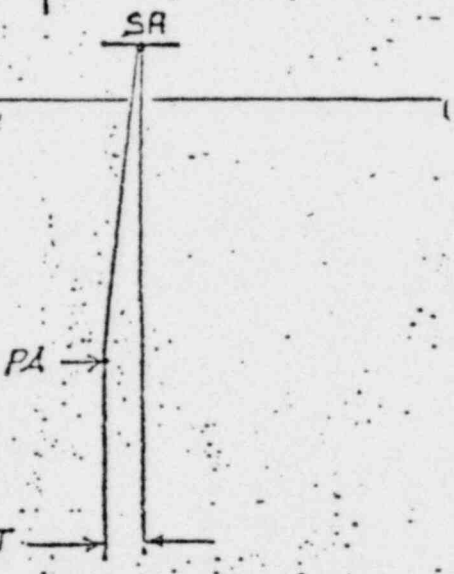
ORIGINAL D.0



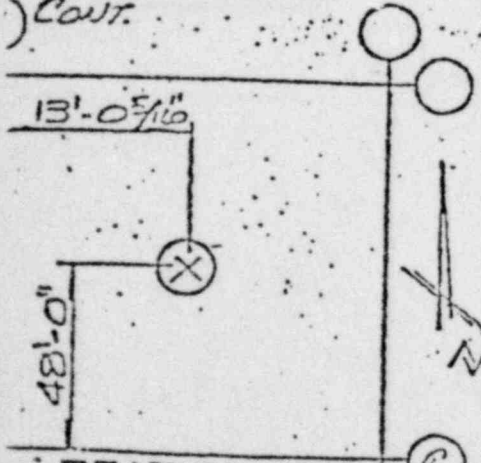
AS BUILT BY FIELD HALO
FOR STRUCTURE ... JUN 2-21-90
HGR ENGR ... DATE 2/12/92
MECH QC ... DATE 2/20/92
~~FOR BASEPLATE AND BOLTS~~
HGR ENGR ... DATE
MECH. QC ... DATE

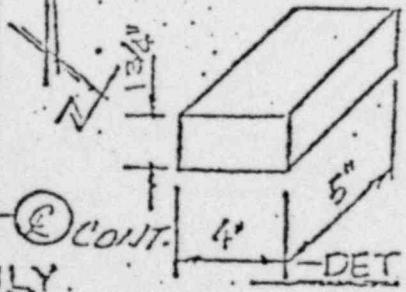
SHEET 2 OF 3

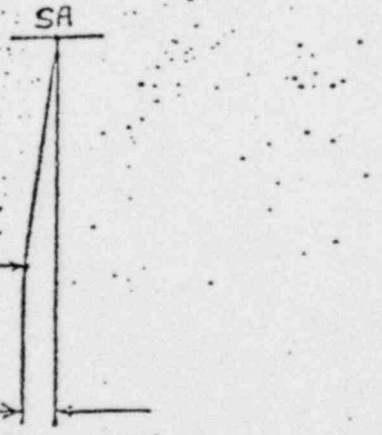




Y Design Load = 24200#
Axial Design Load =
Lat'l Design Load =
Iso. # 2-3
Prob. # 501
Critical H2







~~REFERENCE ONLY~~
~~FOR MATERIALS AND OPERATIONS SEE SKETCH No~~

DRW'G. No. PIPE D-205300-3 ISO 2-3
STEEL D-20[illegible] MARK NO. 2-MS-R&B SKETCH NO. 2-5612 REV.

GRINNELL

CUSTOMER

ORDER OR CONT. No.

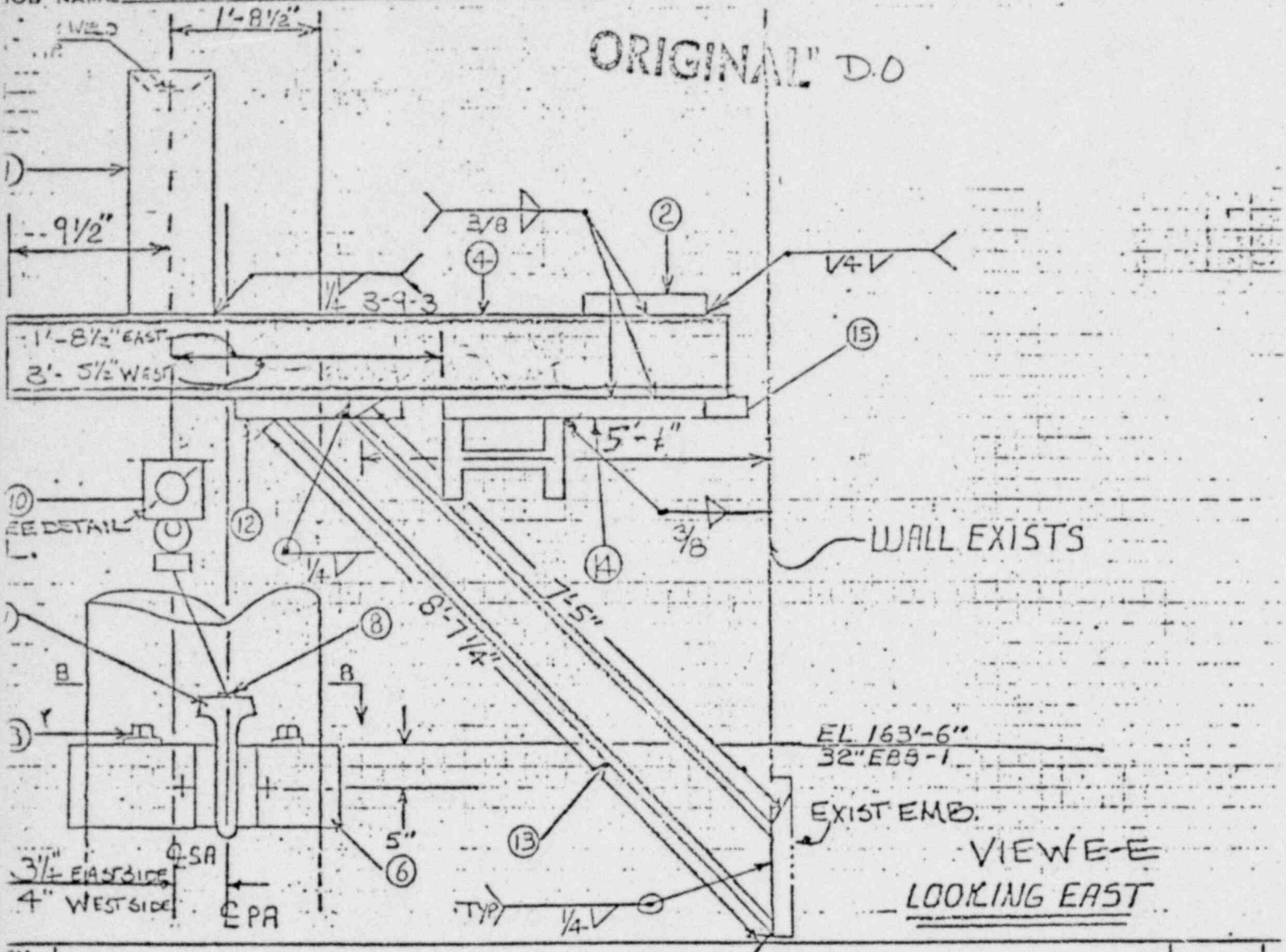
JOB NAME FARLEY NUCLEAR PLANT

PIPE HANGER DEPARTMENT

DRAWN BY R.E.B. DATE 10-31-

REVISED BY DATE

ORIGINAL D.O



ITEM NO.	MATERIALS AND OPERATIONS	QUAN.
	FCR # 2M-50200	
	SHEET 3 OF 5	
	PIPE - 205 300-3 SKETCH. 2-5613	
	MARK - 2MS R 613 ISO. 2-3 SHT 2 OF 4	

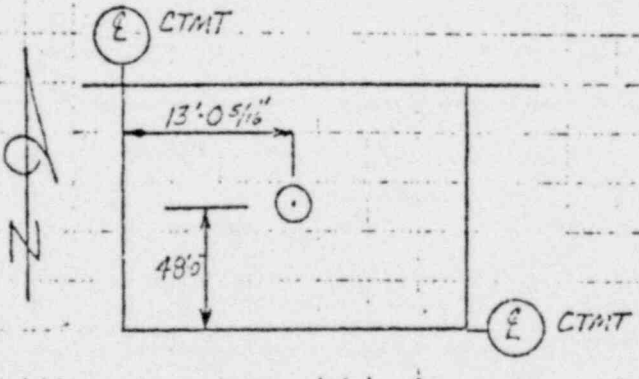
PIPE

BILL OF MATERIAL ORIGINAL D.O

		QUAN.
1	1" X 1'-4" C/S R. 1'-4" LONG. HT# 7478431	1
2	1 1/2" X 8" C/S R. 0'-8" LONG HT# X01135	2
3	1-3/4" X 4" C/S SA515 GR. 65 LUGS 0'-5" LONG HT. # ~~748300~~ DETAIL A - TRACEABILITY REQUIRED.	4
4	C12 X 30 6' 8" LONG HT. # 40403	2 EACH
5	(2) 4' X 10" FIG 146 W/6" THREAD. FULL LENGTH RODS (2) 0' X 10" FIG 146 W/6" " " " "	
6	H.S. 40. "A" C/S A515 GR. 65 - 32" O.D. PIPE DEVELOPED LENGTH/HALF CLAMP = 7'-8". E = 2'-9" (INNER STUDS) 1-3/8" X 9-1/4" F LOAD STUDS = 1-3/4" X 10" G 1-1/2" X 10"	1
7	2" FIG. 290 EYE NUT	4
8	2" HEX NUTS	8
9	#18 FIG 98 W/TRAVEL STOPS - COLD LOAD 12450 HOT LOAD: 12225 - COLD LOAD SHOULD BE GREATER THAN HOT LOAD SINCE PIPE DEFLECTS UPWARD.	2
10	2" PIVOT BRACKET PER DETAIL 1 HT# 7478417	2
11	12 X 30 L 3'-7-1/2" LG (FIELD CUT) HT# 40403	2
12	3/4" X 12" X 12" HT# U02221	1
13	8" WF X 7.31 FT-LBS X 8'-7-1/4" LG HT# ZR79?2	1
14	1" L 13-1/2" C/S R. 1'-6" LG HT# 7478431	1
15	1" L 2 1/2" C/S R. 1'-6" LG HT# 7478431	1
16	1/2" X 3-1/2" C/S R. 1'-0" LG HT# X01135	2
17	1/8" X 1" X 4" LG B6106	1
18	1/16" X 1" X 4" LG HT# OYFK 2959	3

FCR # 2M-50200

SHEET 4 OF 5



I 50-2-3

REF DRWG NO. PIPE 205300-3
STEEL

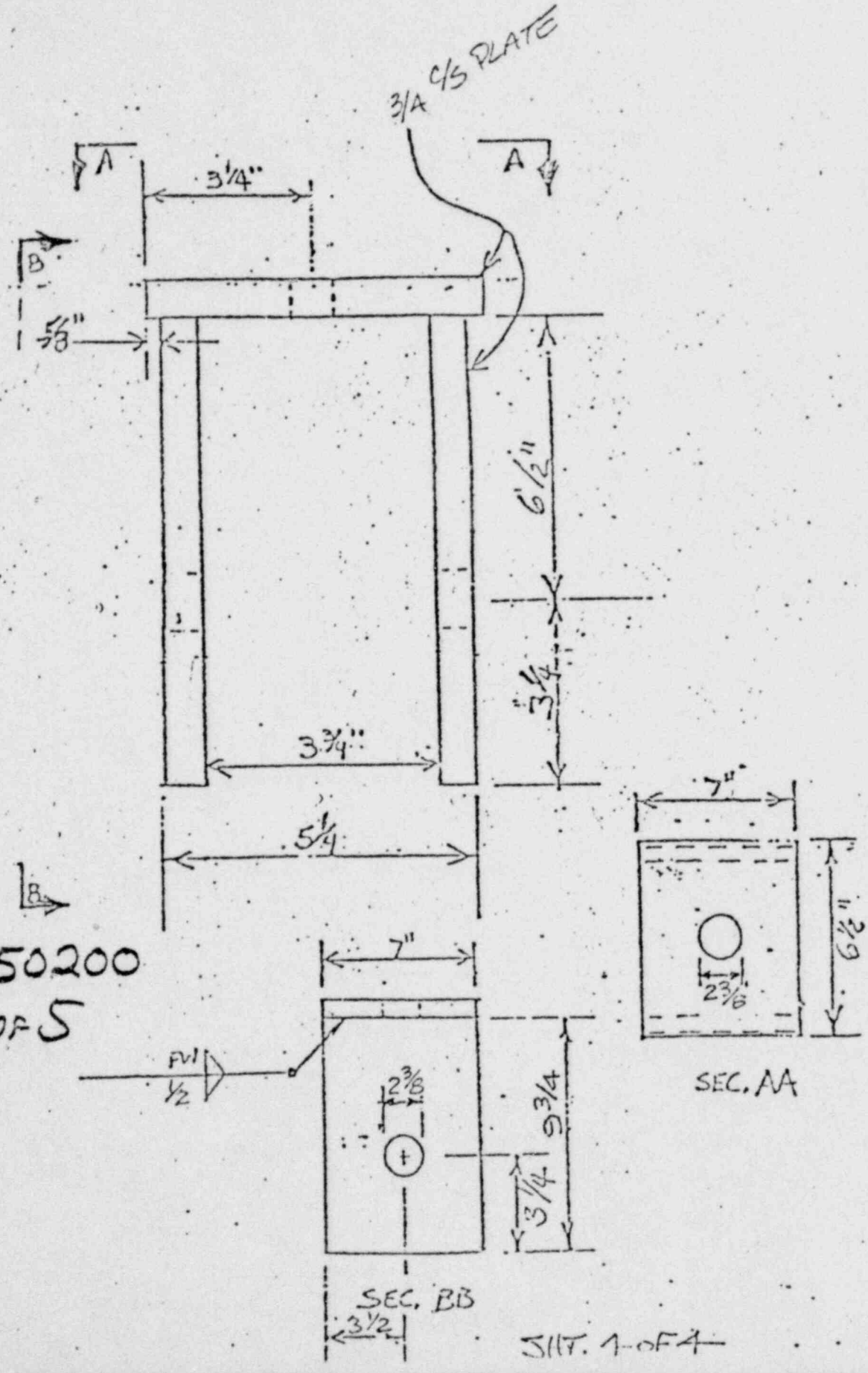
SHT 2073

MARK NO. 2MS-RG13
SKETCH NO. 2-5612-A

SHT 3 OF 4

Pivot Point Bracket for ZMS R613 (2)

ORIGINAL" D.O



DETAIL 1

FCR# 2M-50200
SHEET 5 OF 5

SHT. 1 OF 4

FIELD CHANGE REQUEST

FCR NO. 2M-50203

Joseph M. Farley Plant - Unit II
Field QC Procedure No. 5.3.2.1A
Drawing No.: N/A
Drawing Title: HANGER SKETCHES

Date 2/4/80
TPNS No. A17.07
Revision N/A
System ALL

Addressed to: APCO Construction - Attention J. A. MOONEY
Southern Services, Inc. - Attn.
Bechtel Corporation - Attention A. A. VIZZI
ITT Grinnell Corporation (Hanger Div.)

Originator: [signature] PDE [signature]

QCM [signature]

Existing Condition:

THE FOLLOWING "AS BUILT" HANGER HAS BEEN FIELD VERIFIED PER NRC BULLETIN 79.14 GUIDELINES:

MARK NO.	ISO NO.	CV NO.	DANIEL REV.
2MS-R97	2-3	026	D.0

ABOVE HANGER IS PER 79.14 ONLY, NO BOLTS INVOLVED.

DANIEL CONSTRUCTION OF ALA. RECEIVED FEB 8 1980 DOCUMENT CONTROL

Recommended Action and Responsible Party: ATTEN: R. GANTI/BECHTEL

PLEASE APPROVE ATTACHED "AS BUILT" SKETCH.

RECEIVED FEB 12 1980 JOB 7527.03/20 BECHTEL

URGENCY:
(1) Needed by Noon (time) on 2/18/80 (date)

(2) Justification: 79.14 Completion

APCO NPD REPLY:
Disposition Reference CN No.
QC Hold Tag No. (if applicable):

DISTRIBUTION: QC FOR SUSPENSE FILE, APCO QA FIELD REPRESENTATIVE, APCO NPD, ALL CONST. SUPERINTENDENTS

CUSTOMER
ORDER OR CONT. NO FW2-2-29 2m.50203
JOB NAME WILEY ELEC. STA. UNIT #2

REV. NO. / DATE	1	2	3	4	5

U277031

ORIGINAL
D.0

15°
EAST X
Z
Y

4'-0"
7/8 OFFSET OF REAR BRACKET
N
3½" PIPE
3/8 V
5½"
TRACEABLE MAT.
3
2
F.J. 1/4 V
4
3'
1'-8"
SLOPE 1:1
1'-8"
SLOPE 1:1
2'-6½"

Y Design Load =
X Design Load =
Z Design Load = 13.022
Iso. # 23
Prob. # E2'
Critical Ec
+ #1'-9" WEST

AS BUILT BY FIELD
FOR STRUCTURE
HGR ENG. P. Hoole DATE 10/12/79
MECH QC S. Turner DATE 11-1-79
FOR BASE PLATE AND LEVELING
HGR ENG. _____ DATE _____
MECH QC S. Turner DATE 11-1-79

APLO 1-11-80

A
CABLES EXISTS REL
2-MSR-R3
8
1/4 TYP
18
A
4'-9½"

F.C.R. 2M.5020B SHT 2 of 3
MOVEMENTS
X = .833'
Y = —
Z = 1.133'

PLAN VIEW @ EL. 149'-7½" 32" EBB-1

MOVE 3" WEST IN FIELD
CONT. C
3/8
WIRE X105 EXISTS
17'-6 15/16"
4'-0"
X
0.69'
N
1/4
1/4
3/8
1/4
1/4
SECTION B-B
CONT. C
SECTION A-A
LOCATION PLAN
FOR REFERENCE ONLY

FOR MATERIALS AND OPERATIONS SEE SKETCH NO. 25096 REV. 1

REF. DRW'G.-NO: PIPE D-22E22-4
STEEL D-22N221-6
MARK NO. 2-MS-R97
SKETCH NO. 25021 REV.
SHT. 1 OF 2

ORDER OR CONT. NO. [illegible] 2M-50203 D

JOB NAME: [illegible]

ENG | DATE

ORIGINAL D.O

SEISMIC SHOCK & SWAY SUPPRESSOR CONSISTING OF: ONE
FOLLOWING NEW MATERIAL REQUIRED BY D.C.C.A..

1 6"x6"x1/2" T.S. 5'-2" Long HT 204059 FIELD CUT 1

2 Special H.S. 63, "C" Carbon Steel (ASME-SA-155) 12" HT NS32591
Schedule 40 Stanchion, 32" Pipe, D=1'-9 7/16", E=0'-
6 5/16" Less Base Plate, Traceability Required

3 1/2"x1'-2 3/4" Carbon Steel Plate, 1'-2 3/4" Long HT#7420158 1

MATERIAL EXISTS IN FIELD BY ITT GRINNELL

4 3 1/4" Cylinder, 5" Stroke, Fig. 200, Option #2 1
Hydraulic Shock & Sway Suppressor, Load=12,000#, Cold
Piston Setting=3 1/16", Hot Piston Setting=4 3/16"/PH-74

SEISMIC ASSEMBLY SKETCH & ENGINEERING 1
MARK# 2-MS-R97

FCR
2M-50203
SHT 3 of 3

FOR MATERIALS AND OPERATIONS SEE SKETCH NO 2509G REV 1

REF. DRW'G. NOS. PIPE [illegible] STEEL [illegible] MARK NO 2-MS-R97 KG SKETCH NO 2509GA SHT. 2 OF 2

THERMAL AND SEISMIC MOVEMENTS OF REACTOR COOLANT

LOOP NOZZLES (LOCAL COORDINATES ON INCLUDED SKETCH.)

APW-A-3761

Westinghouse Electric Corporation Power Systems

Water Reactor Divisions
Box 355
Pittsburgh Pennsylvania 15230

MM-RCLA-493
S.O. BHP-84239
Ref.: W-1181

Mr. A Vizzi, Project Engineer
Bechtel Power Corporation
Gaithersburg Power Division
P.O. Box 607
Gaithersburg, MD 20760

Dear Mr. Vizzi:

JOSEPH M. FARLEY NUCLEAR PLANT
RCL Displacements

The following information is attached for your use as requested in W-1181:

I. RCL Thermal Displacements of the Branch Line Nozzles:

a) 100% Power Thermal Condition

b) RHR Suction Thermal Condition
(RCL at 350°F)

c) SIS Recirculation Thermal Condition
(RCL at 170°F)

II. RCL Seismic Displacements of the Branch Line Nozzles due to Inertial Loads which include Effects of Closely-Spaced Modes:

a) OBE X+Y (East/West) and OBE Z+Y (North/South) for three equipment support cases.

b) DBE X+Y and DBE Z+Y for three equipment support cases.

III. RCL Displacements of the Branch Line Nozzle due to Stat[illegible]-Applied RPV Seismic Motion:

a) +X/+Y motion for three equipment support cases.

b) +Z/+Y motion for three equipment support cases.

This data reflects the latest Unit 1 RCL analysis results and should be considered preliminary for Unit 2 auxiliary line analysis as well as updated information for Unit 1 auxiliary lines within you scope.

If you have any questions, please call.

Very truly yours,

WESTINGHOUSE ELECTRIC CORPORATION

R. W. Manz
Reactor Coolant Loop Analysis

T. H. Liu
Reactor Coolant Loop Analysis

H. A. Sindt, Manager
Alabama Project

/djs

Attachment

*A. Vizzi		1L, 1A
cc:	F. E. Ehrensperger	1L, 1A
	F. G. Doar	1L, 1A
	F. S. Moore, Jr.	1L, 1A
F. Clayton	~~S. R. Hart, Jr.~~	1L
	D. L. McCrary	1L

WESTINGHOUSE PWR SYSTEMS DIVISION
MECHANICS AND MATERIALS TECHNOLOGY

TITLE: ALA RCL MOVEMENTS AT AUXILIARY LINES					PAGE: 1
PROJECT: ALA-145	ENGR. R. MAIN	DATE: 10/21/75	CHK. T. H. Lin	DATE: 10/24/75	CHK. NR DATE

THERMAL CASE DEFINITIONS

1) NORMAL OPERATION – RCL AT 100% POWER TEMPERATURES.

2) RHR SUCTION – RCL AT 350°F.

3) SIS RECIRCULATION – RCL AT 170°F.

EQUIPMENT SUPPORT DEFINITIONS

THE EQUIPMENT SUPPORT CASES CHOSEN ARE INDICATED IN THE TITLE OF EACH SEISMIC DISPLACEMENT TABLE AND ARE DEFINED IN APPENDIX B OF "STRUCTURAL ANALYSIS OF REACTOR COOLANT LOOP/SUPPORT SYSTEM FOR ALABAMA JOSEPH M. FARLEY NUCLEAR POWER PLANT UNIT NO. 1", REPORT NO. SD 113.

FOR EXAMPLE:

(SGLS4, SGUS2, RCPS6) OR (4/2/6) INDICATES:

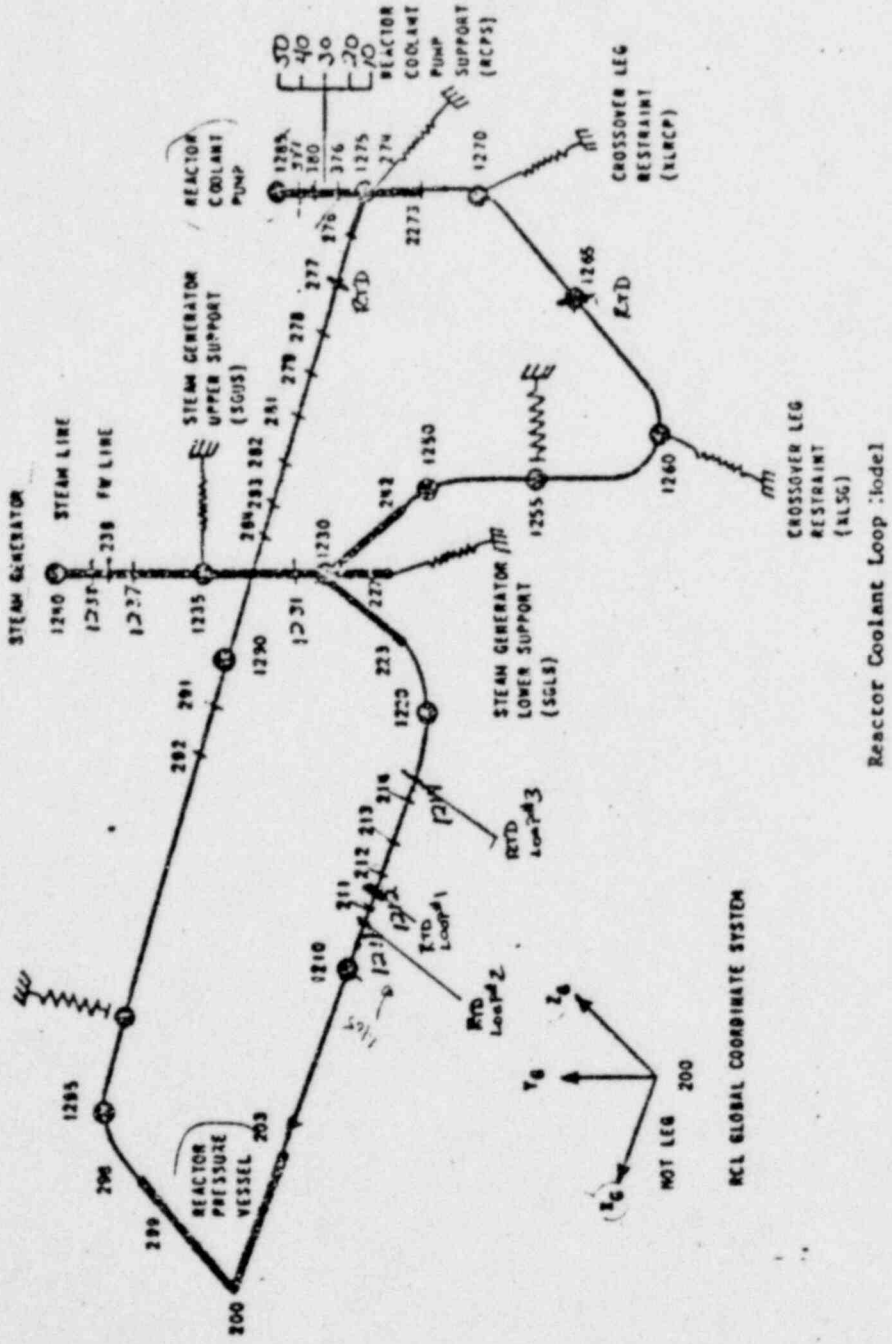
STEAM GENERATOR LOWER SUPPORT CASE 4

STEAM GENERATOR UPPER SUPPORT CASE 2

REACTOR COOLANT PUMP SUPPORT CASE 6

WESTINGHOUSE PWR SYSTEMS DIVISION
MECHANICS AND MATERIALS TECHNOLOGY

TITLE: ALA RCL MOVEMENTS AT AUXILIARY LINES					PAGE: 2
PROJECT: ALA-145	ENGR. R MANN	DATE 10/21/75	CHK. T.H. Lu	DATE 1-24-75	CHK. MK DATE



WESTINGHOUSE FORM 552138

TITLE: ALA RCL MOVEMENTS AT AUXILIARY LINES				PAGE: 3
PROJECT: ALA-145	ENGR.: R MANZ DATE: 10/21/75	CHK.: T. H. Lin DATE: 10/24/75	CHK.: MR	DATE

REACTOR COOLANT LOOP MODEL,

NODE POINTS DESCRIPTION

Node Point	Description
200	Intersection of RPV Nozzles
202	Beginning of RPV Outlet Nozzle
1210	Center of Hot Leg
1211	1 IN. RTD, LOOP 2
211	6 in. from R.H.EX. Loop 3
~~1212~~	1 IN. RTD, LOOP 1
~~212~~	~~14 in. Surge Line~~ Loop 2
	12 in. to RHR Pump Loop 3
213	12 in. RHR Pump Loop 1
214	6 in. from RHR Pump Loops 1 and 2
1214	1 IN. RTD. LOOP 3
1220	Center of 50° Reducing Elbow
223	Safe End of SG Inlet Nozzle
227	SG Lower Support
1230	Intersection of SG Nozzles
1231	EL. 131' 2 1/2"
1235	SG Upper Support
1237	EL. 168' 4"
238	Feedwater Line
1238	EL. 180' 4"
1240	Top of SG (steam line)
242	Safe End of SG Outlet Nozzle
1250	Center of 40° Elbow
1255	Center of Crossover Vertical Leg
1260	Center of 90° Elbow
1265	Center of Crossover Horizontal Leg (CVCS LETDOWN, RTD, RCS DRAIN LINE)
1270	Center of 90° Elbow
2273	Safe End of RCP Inlet Nozzle
274	RCP Lower Support
1275	Intersection of RCP Nozzles
376	Thermal Barrier (RCP) (EL. 125' 8 5/16")
380	Lower Bearing (RCP) (EL. 132' 8 3/4")
381	EL. 133' 5 3/4"
1285	Center of Gravity of Motor (RCP)

WESTINGHOUSE PWR SYSTEMS DIVISION
MECHANICS AND MATERIALS TECHNOLOGY

TITLE: ALA RCL MOVEMENTS AT AUXILIARY LINES				PAGE: 4
PROJECT: ALA-145	ENGR: R MAHZ DATE: 10/21/75	CHK.: T.H. Lin DATE: 11/24/75	CHK.: NR	DATE

REACTOR COOLANT LOOP MODEL,
NODE POINTS DESCRIPTION

Node Point	Description
276	Safe End of RCP Outlet Nozzle
277	2 in. RCS to RTD Manifold (Loops 1, 2, and 3)
278	6 in. from B.I.T. Loop 3
279	4 in. to Press Spray HDR Loop 2
280	6 in. from B.I.T. Loop 1
281	12 in. from Accumulator Loop 3
282	12 in. from Accumulator Loop 2
	4 in. to Press Spray HDR Loop 1
283	3 in. CVCS Loop 2
284	6 in. SIS from B.I.T. Loop 2
1290	Center of Cold Leg
291	12 in. from Accumulator Loop 1
292	3 in. CVCS Loop 1
1295	Center of 32° Elbow
298	Safe End of RPV Inlet Nozzle
299	Beginning of RPV Inlet Nozzle

ADDITIONAL RCP NODE POINTS:

NODE	ELEVATION
10	127' 7 1/2"
20	127' 8 1/4"
30	128' 3 3/16"
40	128' 7 7/8"
50	131' 0"

WESTINGHOUSE FORM 552138

ALA RCL THERMAL DISPLACEMENTS
COORDINATE SYSTEM X ALONG HOT LEG, Y VERTICAL, Z BY RHR

NODE POINT	DEFLECTION (IN) X	Y	Z	ROTATION (RADIANS) X	Y	Z
1211	-1.0519	-.0283	-.0065	-.000194	-.000055	.001989
211	-1.1050	-.0500	-.0071	-.000211	-.000050	.001978
1212	-1.1103	-.0522	-.0072	-.000213	-.000049	.001975
212	-1.1687	-.0757	-.0078	-.000231	-.000042	.001926
213	-1.2272	-.0985	-.0083	-.000249	-.000033	.001843
214	-1.2537	-.1085	-.0085	-.000258	-.000029	.001794
1214	-1.2856	-.1201	-.0087	-.000268	-.000023	.001725
1231	-1.8146	.1907	-.0385	-.000335	.000068	.000402
1237	-1.9811	1.3459	-.1971	-.000372	.000062	.000355
238	-1.9886	1.4181	-.2050	-.000372	.000062	.000354
1238	-2.0317	1.8348	-.2509	-.000376	.000061	.000351
1240	-2.0783	2.2941	-.3026	-.000459	.000041	.000287
1265	-1.6628	-.6481	.6525	-.001380	.000424	.000659
376	-1.6172	.1785	.8611	-.000469	.000376	.000342
10	-1.6251	.2153	.8502	-.000469	.000376	.000342
20	-1.6254	.2160	.8499	-.000469	.000376	.000342
30	-1.6278	.2227	.8466	-.000469	.000376	.000342
40	-1.6294	.2272	.8444	-.000469	.000376	.000342
50	-1.6390	.2543	.8312	-.000469	.000376	.000342
380	-1.6461	.2742	.8215	-.000469	.000376	.000342
381	-1.6492	.2829	.8173	-.000469	.000376	.000342
277	-1.3421	.0279	.7681	-.000408	.000358	.000427
278	-1.3164	.0299	.7575	-.000384	.000350	.000458
279	-1.2906	.0321	.7469	-.000361	.000342	.000488
280	-1.2046	.0409	.7120	-.000287	.000316	.000571
281	-1.1065	.0531	.6730	-.000212	.000286	.000639
282	-1.1011	.0538	.6708	-.000208	.000284	.000642
283	-1.0234	.0647	.6404	-.000156	.000260	.000673
284	-.9325	.0782	.6055	-.000103	.000231	.000687
291	-.8675	.0881	.5809	-.000069	.000210	.000682
292	-.7893	.0999	.5517	-.000035	.000185	.000659

TITLE: ALA RCL THERMAL MOVEMENTS AT AUXILIARY LINES
PROJECT: ALA -1145
ENGR: R MANZ 10/31/75 DATE
CHK: T.H. Fan 10/24/75 DATE
CHK: NR DATE
PAGE 5

WESTINGHOUSE PWR SYSTEMS DIVISION
MECHANICS AND MATERIALS TECHNOLOGY

WESTINGHOUSE FORM 662138

ALA RCL THERMAL - RHR SUCTION

ALA RCL THERMAL DISPLACEMENTS
COORDINATE SYSTEM X ALONG HOT LEG, Y VERTICAL, Z BY RHR

NODE POINT	DEFLECTION (IN) X	Y	Z	ROTATION (RADIANS) X	Y	Z
1211	-.5284	-.0118	-.0093	-.000104	-.000165	.001059
211	-.5551	-.0234	-.0110	-.000113	-.000181	.001053
1212	-.5577	-.0245	-.0112	-.000114	-.000183	.001052
212	-.5871	-.0371	-.0133	-.000123	-.000200	.001026
213	-.6165	-.0492	-.0155	-.000133	-.000218	.000983
214	-.6298	-.0545	-.0167	-.000138	-.000226	.000957
1214	-.6458	-.0607	-.0180	-.000143	-.000236	.000921
1231	-.9143	.0948	-.0702	-.000189	-.000346	.000207
1237	-1.0008	.7087	-.1587	-.000206	-.000349	.000185
238	-1.0048	.7380	-.1631	-.000206	-.000349	.000185
1238	-1.0274	.9067	-.1885	-.000208	-.000349	.000184
1240	-1.0518	1.0927	-.2170	-.000245	-.000357	.000155
1265	-.9124	-.3744	.3207	-.000788	-.000331	.000337
376	-.9310	.1024	.4466	-.000295	-.000125	.000257
10	-.9369	.1392	.4397	-.000295	-.000125	.000257
20	-.9371	.1400	.4395	-.000295	-.000125	.000257
30	-.9389	.1466	.4375	-.000295	-.000125	.000257
40	-.9401	.1512	.4361	-.000295	-.000125	.000257
50	-.9474	.1783	.4278	-.000295	-.000125	.000257
380	-.9527	.1982	.4217	-.000295	-.000125	.000257
381	-.9550	.2069	.4190	-.000295	-.000125	.000257
277	-.7640	.0183	.4132	-.000263	-.000090	.000291
278	-.7487	.0197	.4087	-.000250	-.000076	.000303
279	-.7333	.0211	.4041	-.000237	-.000063	.000314
280	-.6824	.0263	.3883	-.000197	-.000023	.000345
281	-.6248	.0332	.3694	-.000155	.000014	.000368
282	-.6216	.0336	.3684	-.000153	.000016	.000369
283	-.5762	.0395	.3529	-.000123	.000040	.000377
284	-.5234	.0467	.3344	-.000092	.000062	.000375
291	-.4857	.0518	.3210	-.000072	.000073	.000367
292	-.4406	.0579	.3046	-.000050	.000082	.000350

WESTINGHOUSE FORM 582138

WESTINGHOUSE PWR SYSTEMS DIVISION
MECHANICS AND MATERIALS TECHNOLOGY

TITLE: ALA RCL THERMAL MOVEMENTS AT AUXILIARY LINES
PROJECT: ALA-145
ENGR. [illegible] DATE 10/21/75
CHK. [illegible] DATE 10/24/75
CHK. [illegible] DATE
PAGE 6

ALA RCL THERMAL DISPLACEMENTS
COORDINATE SYSTEM X ALONG HOT LEG, Y VERTICAL, Z BY RHR

NODE POINT	DEFLECTION (IN) X	Y	Z	ROTATION (RADIANS) X	Y	Z
1211	-.1815	-.0059	-.0036	-.000039	-.000064	.000397
211	-.1908	-.0102	-.0042	-.000042	-.000070	.000395
1212	-.1917	-.0106	-.0043	-.000043	-.000070	.000395
212	-.2020	-.0153	-.0051	-.000045	-.000077	.000386
213	-.2122	-.0199	-.0060	-.000050	-.000083	.000370
214	-.2169	-.0219	-.0064	-.000052	-.000087	.000360
1214	-.2224	-.0242	-.0069	-.000054	-.000090	.000347
1231	-.3161	.0264	-.0268	-.000071	-.000132	.000093
1237	-.3512	.2349	-.0599	-.000077	-.000133	.000076
238	-.3528	.2449	-.0615	-.000077	-.000133	.000076
1238	-.3621	.3022	-.0710	-.000077	-.000133	.000075
1240	-.3722	.3654	-.0816	-.000090	-.000136	.000066
1265	-.3144	-.1329	.1112	-.000306	-.000127	.000131
376	-.3232	.0354	.1525	-.000117	-.000050	.000099
10	-.3255	.0723	.1498	-.000117	-.000050	.000099
20	-.3255	.0730	.1497	-.000117	-.000050	.000099
30	-.3262	.0797	.1489	-.000117	-.000050	.000099
40	-.3267	.0842	.1484	-.000117	-.000050	.000099
50	-.3295	.1113	.1451	-.000117	-.000050	.000099
380	-.3315	.1312	.1426	-.000117	-.000050	.000099
381	-.3324	.1399	.1416	-.000117	-.000050	.000099
277	-.2645	.0064	.1418	-.000105	-.000037	.000110
278	-.2592	.0069	.1402	-.000100	-.000032	.000114
279	-.2538	.0074	.1386	-.000095	-.000027	.000118
280	-.2361	.0093	.1332	-.000080	-.000012	.000128
281	-.2160	.0118	.1267	-.000064	.000003	.000136
282	-.2149	.0119	.1263	-.000063	.000003	.000136
283	-.1990	.0141	.1210	-.000052	.000012	.000135
284	-.1806	.0167	.1145	-.000040	.000021	.000137
291	-.1675	.0185	.1099	-.000032	.000025	.000134
292	-.1517	.0207	.1042	-.000024	.000029	.000127

TITLE: ALA RCL THERMAL MOVEMENTS AT AUXILIARY LINES
PROJECT: ALA -145
ENGR: [illegible] 10/25/85
CHK.
DATE
CHK.
DATE
PAGE 7
DATE

WESTINGHOUSE PWR SYSTEMS DIVISION
MECHANICS AND MATERIALS TECHNOLOGY

WESTINGHOUSE FORM 552138

WESTINGHOUSE PWR SYSTEMS DIVISION
MECHANICS AND MATERIALS TECHNOLOGY

TITLE: ALA RCL DBE X+Y MOMENTS AT AUXILIARY [illegible]
PROJECT: ALA-145
ENGR: [illegible] DATE: 10/23/75
CHK: T.H. [illegible] DATE: 10/24/75
PAGE: 8

ALA RCL DBE X+Y (SGLS0,SGLS2,RCPS61)

X=SHOCK = EAST/WEST DIRECTION, Z=SHOCK = NORTH/SOUTH DIRECTION
COORDINATE SYSTEM X ALONG HOT LEG, Y VERTICAL, Z BY RHR

NODE POINT	DEFLECTION (IN) X	Y	Z	ROTATION (RADIANS) X	Y	Z
1211	.0029	.0183	.0063	.000015	.000060	.0001P8
211	.0031	.0203	.0070	.000016	.000057	.000180
1212	.0032	.0205	.0071	.000016	.000057	.000179
212	.0038	.0226	.0077	.000017	.000053	.000171
213	.0037	.0246	.0080	.000019	.000048	.000160
214	.003P	.0255	.0086	.000020	.000045	.000154
1213	.0040	.0268	.0089	.000020	.000041	.000146
1231	.0076	.0319	.0059	.000032	.000031	.000059
1237	.0581	.0376	.0060	.000036	.000032	.000237
234	.0A32	.0377	.0068	.000036	.000032	.000240
1238	.0030	.03P0	.0117	.000039	.000032	.000253
1240	.1300	.0385	.0176	.000083	.000034	.000266
1245	.0046	.0100	.0088	.000236	.000181	.0003E4
376	.0278	.0058	.0051	.000340	.000148	.000507
19	.0340	.0058	.0050	.000347	.000148	.000503
20	.0340	.005P	.0050	.000349	.000148	.000554
30	.0028	.005P	.0053	.000410	.000148	.000546
40	.0057	.005P	.0055	.000423	.000148	.000547
50	.0A51	.005P	.0532	.000402	.000148	.000716
3P0	.0P04	.0058	.0581	.000508	.000148	.000741
3P1	.0P70	.005P	.0606	.000509	.000148	.000742
277	.0140	.0206	.0048	.000323	.000158	.000387
278	.014P	.0247	.0036	.000312	.000163	.000386
279	.014P	.0284	.0027	.000301	.000168	.000376
280	.0137	.0326	.0358	.000249	.000184	.000187
281	.0124	.0305	.0353	.000238	.000202	.000085
282	.0124	.0305	.0350	.000236	.000203	.000081
283	.0113	.0300	.0318	.000218	.000215	.000070
284	.0099	.0317	.0269	.000105	.000226	.000122
241	.008P	.0291	.0235	.000181	.000231	.000160
282	.0075	.0252	.0193	.000185	.000231	.000198

WESTINGHOUSE FORM 56213B

WESTINGHOUSE PWR SYSTEMS DIVISION
MECHANICS AND MATERIALS TECHNOLOGY

TITLE: ALA RCL DRE X+Y MOVEMENTS AT AUXILIARY LINES | PAGE: 7
PROJECT: ALA -1145 | ENGR: R MANZ 10/17/75 | CHK: L H Fan 10/24/75 | DATE: 11/2

ALA RCL DRE X+Y (SCLSA,SCUSA2,FCP85)

X-SPECK = EAST/WEST DIRECTION, Z-SPECK = NORTH/SOUTH DIRECTION
COORDINATE SYSTEM: X ALONG HOT LEG, Y VERTICAL, Z BY RHR

NODE POINT	DEFLECTION (IN) X	Y	Z	ROTATION (RADIANS) X	Y	Z
1211	.0029	.0193	.0043	.000010	.000041	.000194
211	.0031	.0214	.0048	.000011	.000039	.000189
1212	.0032	.0216	.0048	.000011	.000038	.000189
212	.0034	.0238	.0053	.000012	.000036	.000180
213	.0037	.0259	.0057	.000013	.000032	.000169
214	.0038	.0268	.0059	.000015	.000030	.000162
1214	.0039	.0279	.0061	.000014	.000027	.000158
1231	.0077	.0336	.0040	.000021	.000028	.000059
1237	.0581	.0358	.0067	.000039	.000029	.000237
238	.0432	.0359	.0076	.000040	.000029	.000240
1238	.0938	.0402	.0129	.000083	.000029	.000253
1200	.1393	.0407	.0193	.000086	.000031	.000286
1265	.0546	.0183	.0098	.000208	.000161	.000356
376	.0252	.0052	.0368	.000201	.000056	.000478
10	.0358	.0052	.0380	.000341	.000059	.000519
20	.0362	.0052	.0381	.000313	.000056	.000522
30	.0401	.0052	.0388	.000528	.000056	.000553
40	.0428	.0052	.0395	.000538	.000056	.000573
50	.0413	.0052	.0448	.000589	.000059	.000678
380	.0758	.0052	.0502	.000401	.000059	.000659
381	.0821	.0052	.0528	.000401	.000059	.000701
277	.0136	.0235	.0388	.000256	.000070	.000363
278	.0155	.0255	.0341	.000205	.000077	.000323
279	.0133	.0272	.0336	.000235	.000088	.000285
280	.0127	.0313	.0319	.000204	.000109	.000170
281	.0117	.0331	.0292	.000177	.000137	.000069
282	.0114	.0331	.0290	.000176	.000138	.000065
283	.0107	.0327	.0284	.000159	.000156	.000061
284	.0095	.0304	.0231	.000184	.000178	.000117
291	.0086	.0280	.0204	.000136	.000184	.000155
292	.0078	.0282	.0170	.000126	.000190	.000188

WESTINGHOUSE FORM 652138

WESTINGHOUSE PWR SYSTEMS DIVISION
MECHANICS AND MATERIALS TECHNOLOGY

TITLE	ALA RCL DUE X+Y MOVEMENTS AT AUXILIARY LINES			PAGE
PROJECT	ENGR.	DATE	CHK.	DATE
ALA-145	A PRINZ	10/21/75	[illegible]	NR

ALA RCL DBE X+Y (SGLS6,SGUB2,RCPS5)

X=SHOCK = EAST/WEST DIRECTION, Z=SHOCK = NORTH/SOUTH DIRECTION
COORDINATE SYSTEM X ALONG HOT LEG, Y VERTICAL, Z BY RHR

NODE POINT	DEFLECTION (IN) X	Y	Z	ROTATION (RADIANS) X	Y	Z
1211	.0029	.0196	.0007	.000005	.000006	.000198
211	.0031	.0218	.0008	.000006	.000008	.000193
1212	.0032	.0220	.0008	.000006	.000008	.000193
212	.0038	.0243	.0008	.000006	.000006	.000184
213	.0037	.0264	.0009	.000007	.000005	.000172
214	.0038	.0274	.0009	.000007	.000005	.000165
1218	.0040	.0284	.0009	.000007	.000005	.000157
1231	.0078	.0343	.0003	.000009	.000012	.000059
1237	.0582	.0406	.0037	.000022	.000012	.000237
238	.0433	.0407	.0042	.000022	.000013	.000240
1238	.0440	.0410	.0072	.000024	.000013	.000253
1240	.1304	.0416	.0108	.000026	.000015	.000267
1245	.0838	.0198	.0453	.000257	.000163	.000362
376	.0253	.0052	.0350	.000281	.000000	.000[illegible]
10	.0341	.0052	.0371	.000300	.000000	.00
20	.0366	.0052	.0372	.000342	.000000	.000527
30	.0405	.0052	.0382	.000317	.000000	.000558
40	.0433	.0052	.0389	.000326	.000000	.000578
50	.0427	.0052	.0448	.000376	.000000	.000682
380	.0768	.0052	.0503	.000388	.000000	.000706
381	.0831	.0052	.0529	.000388	.000000	.000707
277	.0131	.0238	.0320	.000286	.000067	.000366
278	.0130	.0258	.0320	.000295	.000073	.000326
278	.0128	.0275	.0317	.000294	.000079	.000287
280	.0122	.0316	.0301	.000194	.000102	.000170
281	.0119	.0315	.0276	.000187	.000128	.000087
282	.0117	.0315	.0270	.000185	.000129	.000083
283	.0104	.0330	.0250	.000150	.000147	.000059
288	.0092	.0308	.0219	.000136	.000164	.000118
291	.0088	.0283	.0154	.000129	.000174	.000156
292	.0072	.0245	.0102	.000121	.000180	.000190

WESTINGHOUSE FORM 552138

WESTINGHOUSE PWR SYSTEMS DIVISION
MECHANICS AND MATERIALS TECHNOLOGY

TITLE	ALA RCL DUE TO MOVEMENTS AT AUXILIARY LINES	PAGE	11
PROJECT	ALA -145	ENGR.	RMB/HZ 10/21/75
CHK.	[illegible]	DATE	
CHK.	[illegible] 10/24/75	DATE	
CHK.	NVR	DATE	

ALA RCL DUE TO Z+T (BRL50,BRL82,RCP86)

X-BRCCK = EAST/WEST DIRECTION, Z-BRCCK = NORTH/SOUTH DIRECTION
COORDINATE SYSTEM X ALONG HOT LEG, Y VERTICAL, Z BY RHR

ANCF POINT	DEFLECTION (IN) X	Y	Z	ROTATION (RADIANS) X	Y	Z
1211	.0005	.0245	.0105	.000022	.000169	.000209
211	.0007	.0272	.0204	.000029	.000159	.000208
1212	.0007	.0275	.0205	.000024	.000158	.000203
212	.0008	.0303	.0225	.000026	.000163	.000233
213	.0009	.0331	.0242	.000028	.000124	.000218
214	.0009	.0343	.0249	.000029	.000114	.000210
1214	.0009	.0357	.0257	.000030	.000101	.000198
1231	.0021	.0436	.0166	.000057	.000123	.000012
1237	.0028	.0515	.0081	.000268	.000124	.000014
239	.0030	.0515	.0521	.000272	.000124	.000014
1238	.0043	.0519	.0482	.000288	.000124	.000015
1240	.0063	.0526	.1308	.000305	.000126	.000014
1265	.0280	.0220	.0967	.000276	.000124	.000118
576	.0001	.0043	.1327	.000715	.000299	.000237
10	.0038	.0043	.1483	.000788	.000299	.000251
20	.0080	.0043	.1487	.000751	.000299	.000252
30	.0052	.0043	.1486	.000777	.000299	.000262
40	.0062	.0043	.1518	.000793	.000299	.000269
50	.0528	.0043	.1696	.000879	.000299	.000308
380	.0579	.0043	.1894	.000900	.000299	.000313
381	.0598	.0043	.1910	.000901	.000299	.000313
277	.0298	.0049	.0958	.000643	.000350	.000213
278	.0292	.0078	.0973	.000607	.000369	.000205
279	.0285	.0077	.0950	.000650	.000387	.000198
280	.0260	.0087	.0867	.000579	.000439	.000176
281	.0230	.0050	.0763	.000511	.000481	.000156
282	.0228	.0050	.0757	.000507	.000483	.000155
283	.0202	.0048	.0669	.000457	.000524	.000142
284	.0170	.0042	.0563	.000400	.000515	.000129
291	.0147	.0035	.0484	.000359	.000515	.000121
292	.0119	.0065	.0393	.000310	.000501	.000111

WESTINGHOUSE FORM 652138

TITLE: ALA RCL DBE ZPV MOVEMENTS AT AUXILIARY LINES

PROJECT: ALA-145 | ENGR: R. Mraz | DATE: 10/31/75 | CHK: T. H. Hutchison | DATE: 10/31/75 | CHK: MR | DATE: | PAGE: 12

ALA RCL DBE ZPV (SGLS0,SGLB2,RCP85)

X=STORM = EAST/WEST DIRECTION, Z=SHOCK = NORTH/SOUTH DIRECTION
COORDINATE SYSTEM X ALONG HOT LEG, Y VERTICAL, Z BY RHR

NODE POINT	DEFLECTION (IN) X	Y	Z	ROTATION (RADIANS) X	Y	Z
1211	.0006	.0242	.0168	.000015	.000152	.000247
211	.0007	.0269	.0185	.000016	.000163	.000262
1212	.0007	.0272	.0186	.000016	.000162	.000261
212	.0007	.0303	.0204	.000018	.000128	.000231
213	.0008	.0327	.0219	.000019	.000110	.000216
214	.0008	.0339	.0226	.000020	.000101	.000208
1214	.0009	.0353	.0232	.000021	.000088	.000197
1231	.0022	.0491	.0151	.000083	.000118	.000011
1237	.0027	.0511	.0453	.0002A4	.000119	.000014
238	.0029	.0511	.0513	.0002A8	.000119	.000014
1238	.0041	.0515	.0468	.0002A6	.000119	.000015
1200	.0060	.0522	.1267	.0003A0	.000121	.000014
1265	.0299	.0196	.0642	.0002A6	.000070	.000133
376	.0312	.0032	.0963	.000532	.000092	.000220
10	.0350	.0032	.0955	.000567	.000092	.000234
20	.0351	.0032	.0958	.0005A0	.000092	.000235
30	.0368	.0032	.0950	.000579	.000092	.000245
40	.0378	.0032	.1017	.000502	.000092	.000252
50	.0437	.0032	.1159	.000657	.000092	.000286
3A0	.0440	.0032	.1277	.000672	.000092	.000296
3P1	.0512	.0032	.1329	.000673	.000092	.000295
277	.0248	.0071	.0691	.000484	.000188	.000190
278	.0245	.0076	.0681	.000482	.000184	.000181
279	.0241	.0081	.0671	.000478	.000180	.000171
280	.0224	.0091	.0628	.000430	.000282	.000185
281	.0205	.0096	.0587	.000388	.000296	.000171
282	.0200	.0096	.0568	.000381	.000298	.000120
283	.0188	.0094	.0504	.000345	.000331	.000106
284	.0180	.0087	.0434	.000343	.000357	.000096
291	.0102	.0080	.0382	.000275	.000348	.000040
292	.0110	.0089	.0315	.000247	.000370	.000085

WESTINGHOUSE FORM 552138

WESTINGHOUSE PWR SYSTEMS DIVISION
MECHANICS AND MATERIALS TECHNOLOGY

TITLE: ALA RCL DBE Z+Y MOVEMENTS AT AUXILIARY LINES | PAGE: 13
PROJECT: ALA-1415 | ENGR: A. Ahmad 10/24/75 | CHK: T. H. Lin 10/24/75 | CHK: MR | DATE:

WESTINGHOUSE FORM 562138

ALA RCL DBE Z+Y (RCLNS,RCL92,RCPS5)

X=EAST/WEST DIRECTION, Z=SOUTH/NORTH DIRECTION
COORDINATE SYSTEM X ALONG HOT LEG, Y VERTICAL, Z BY RHR

NODE POINT	DEFLECTION (IN) X	Y	Z	ROTATION (RADIANS) X	Y	Z
1211	.0004	.0230	.0026	.000008	.000024	.000235
211	.0006	.0256	.0029	.000009	.000023	.000230
1212	.0006	.0258	.0029	.000009	.000023	.000229
212	.0007	.0285	.0032	.000010	.000021	.000219
213	.0008	.0311	.0035	.000011	.000018	.000205
214	.0008	.0322	.0036	.000011	.000017	.000197
1214	.0008	.0335	.0037	.000012	.000015	.000187
1231	.0023	.0010	.0038	.000013	.000019	.000010
1237	.0018	.0026	.0587	.000308	.000021	.000011
238	.0017	.0026	.0865	.000380	.000021	.000011
1238	.0021	.0090	.1138	.000375	.000021	.000012
1240	.0035	.0057	.1700	.000481	.000026	.000011
1245	.0220	.0150	.0522	.000278	.000070	.000157
376	.0311	.0029	.0948	.000517	.000088	.000266
10	.0347	.0029	.0589	.000581	.000086	.000263
20	.0358	.0029	.0953	.000583	.000086	.000269
30	.0370	.0029	.0587	.000581	.000086	.000276
40	.0385	.0029	.1010	.000573	.000086	.000284
50	.0402	.0029	.1165	.000638	.000086	.000326
3P0	.0529	.0029	.1284	.000688	.000086	.000336
3P1	.0552	.0029	.1339	.000688	.000086	.000336
271	.0238	.0050	.0658	.000481	.000137	.000207
27A	.0235	.0097	.0849	.000469	.000157	.000198
270	.0231	.0103	.0939	.000467	.000176	.000182
2P0	.0218	.0118	.0558	.000417	.000233	.000187
2P1	.0198	.0128	.0630	.000373	.000284	.000119
2P2	.0195	.0128	.0638	.000370	.000287	.000118
2P3	.0174	.0122	.0682	.000335	.000317	.000105
2P4	.0153	.0114	.0613	.000284	.000341	.000097
291	.0135	.0105	.0362	.000245	.000351	.000098
292	.0118	.0091	.0298	.000211	.000352	.000095

ALA RCL DBE X+Y (SGLS4,SGUS2,RCPS6)

X-SHOCK - EAST/WEST DIRECTION, Z-SHOCK - NORTH/SOUTH DIRECTION
COORDINATE SYSTEM X ALONG HOT LEG, Y VERTICAL, Z BY RHR

NODE POINT	DEFLECTION (IN) X	Y	Z	ROTATION (RADIANS) X	Y	Z
1211	.0038	.0158	.0060	.000013	.000056	.000158
211	.0041	.0176	.0067	.000014	.000053	.000154
1212	.0041	.0177	.0067	.000014	.000053	.000154
212	.0045	.0195	.0074	.000015	.000049	.000147
213	.0048	.0213	.0079	.000017	.000044	.000137
214	.0050	.0220	.0082	.000017	.000041	.000132
1214	.0052	.0228	.0084	.000018	.000037	.000125
1231	.0055	.0272	.0054	.000028	.000034	.000078
1237	.0826	.0322	.0059	.000035	.000035	.000335
239	.0899	.0322	.0067	.000035	.000035	.000339
1239	.1337	.0324	.0114	.000038	.000036	.000357
1240	.1856	.0329	.0170	.000042	.000040	.000376
1205	.0351	.0127	.0501	.000196	.000151	.000277
375	.0241	.0046	.0553	.000350	.000153	.000385
10	.0317	.0046	.0579	.000373	.000153	.000418
20	.0320	.0046	.0585	.000375	.000153	.000421
30	.0349	.0046	.0590	.000392	.000153	.000445
40	.0369	.0046	.0598	.000403	.000153	.000461
50	.0411	.0046	.0659	.000461	.000153	.000543
380	.0625	.0046	.0716	.000475	.000153	.000561
381	.0674	.0046	.0744	.000475	.000153	.000562
277	.0148	.0185	.0458	.000318	.000167	.000296
278	.0145	.0200	.0449	.000309	.000172	.000286
279	.0143	.0214	.0439	.000299	.000178	.000237
280	.0133	.0245	.0405	.000270	.000196	.000151
281	.0120	.0259	.0360	.000239	.000214	.000080
282	.0119	.0259	.0358	.000238	.000215	.000078
283	.0108	.0255	.0320	.000218	.000226	.000069
284	.0094	.0238	.0273	.000193	.000230	.000099
291	.0083	.0219	.0236	.000177	.000238	.000125
292	.0070	.0189	.0195	.000153	.000236	.000148

WESTINGHOUSE FORM 652138

WESTINGHOUSE PWR SYSTEMS DIVISION
MECHANICS AND MATERIALS TECHNOLOGY

TITLE: ALA RCL DBE X+Y MOMENTS AT AUXILIARY LINES
PROJECT: ALA-145
ENGR: P. [illegible] 10/21/75
CHK: T. H. [illegible] 10/24/75
DATE
CHK
DATE
PAGE: 14
DATE

ALA RCL DBE X+Y (SGLS4,SGUS?,RCPS5)

X-SHOCK - EAST/WEST DIRECTION, Z-SHOCK - NORTH/SOUTH DIRECTION
COORDINATE SYSTEM X ALONG HOT LEG, Y VERTICAL, Z BY RHR

NODE POINT	DEFLECTION (IN) X	Y	Z	ROTATION (RADIANS) X	Y	Z
1211	.0038	.0168	.0046	.000009	.000041	.000168
211	.0041	.0186	.0051	.000010	.000039	.000163
1212	.0041	.0188	.0051	.000010	.000039	.000163
212	.0045	.0207	.0056	.000011	.000036	.000155
213	.0048	.0225	.0060	.000012	.000031	.000145
214	.0050	.0233	.0062	.000012	.000029	.000140
1214	.0052	.0242	.0064	.000013	.000026	.000132
1231	.0055	.0289	.0040	.000020	.000032	.000079
1237	.0026	.0342	.0063	.000037	.000033	.000335
238	.0898	.0342	.0071	.000037	.000033	.000339
1238	.1336	.0345	.0121	.000040	.000033	.000357
1240	.1855	.0350	.0180	.000044	.000036	.000376
1265	.0342	.0129	.0443	.000208	.000134	.000271
375	.0297	.0041	.0496	.000307	.000069	.000365
10	.0302	.0041	.0496	.000325	.000069	.000396
20	.0305	.0041	.0490	.000327	.000069	.000398
30	.0303	.0041	.0504	.000341	.000069	.000422
40	.0302	.0041	.0515	.000349	.000069	.000437
50	.0498	.0041	.0588	.000395	.000069	.000514
360	.0596	.0041	.0551	.000407	.000069	.000531
381	.0643	.0041	.0510	.000407	.000069	.000532
277	.0145	.0176	.0365	.000279	.000089	.000280
278	.0143	.0191	.0380	.000269	.000091	.000251
279	.0141	.0204	.0375	.000260	.000102	.000223
280	.0139	.0234	.0359	.000233	.000134	.000140
281	.0172	.0246	.0322	.000206	.000150	.000072
282	.0172	.0249	.0320	.000204	.000161	.000069
283	.0111	.0244	.0240	.000195	.000150	.000062
284	.0098	.0228	.0252	.000155	.000197	.000095
291	.0069	.0209	.0222	.000152	.000206	.000120
292	.0075	.0181	.0184	.000130	.000210	.000143

WESTINGHOUSE FORM 552138

WESTINGHOUSE PWR SYSTEMS DIVISION
MECHANICS AND MATERIALS TECHNOLOGY

TITLE		PAGE
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PROJECT: ALA-1115	ENGR: R. DAVIS 1-10-75 / DATE	
	CHK: T. H. Lee 1/10/75 / DATE	
	CHK: NR / DATE	

WESTINGHOUSE PWR SYSTEMS DIVISION
MECHANICS AND MATERIALS TECHNOLOGY

TITLE: ALA RCL DBE X-Y MOVEMENTS AT AUXILIARY LINES | PAGE: 16
PROJECT: ALA-1485 | ENGR: R Milne Robbins | DATE | CHK: L H Hsu | DATE: 10/24/75 | CHK: NR | DATE

ALA RCL DBE X-Y (SSLSS,SGUS2,RCPSS)

X-SHOCK - EAST/WEST DIRECTION, Z-SHOCK - NORTH/SOUTH DIRECTION
COORDINATE SYSTEM X ALONG HOT LEG, Y VERTICAL, Z BY RHR

NODE POINT	DEFLECTION (IN) X	Y	Z	ROTATION (RADIANS) X	Y	Z
1211	.0038	.0171	.0006	.000005	.000006	.000171
211	.0041	.0190	.0007	.000005	.000006	.000167
1212	.0042	.0191	.0007	.000005	.000005	.000166
212	.0045	.0211	.0008	.000008	.000005	.000159
213	.0049	.0230	.0008	.000006	.000005	.000148
214	.0050	.0238	.0008	.000007	.000005	.000142
1214	.0052	.0247	.0009	.000007	.000005	.000135
1231	.0057	.0295	.0003	.000009	.000011	.000079
1237	.0027	.0349	.0031	.000018	.000012	.000335
238	.0000	.0349	.0036	.000019	.000012	.000340
1238	.1339	.0352	.0061	.000020	.000012	.000358
1240	.1859	.0357	.0041	.000023	.000017	.000376
1265	.0344	.0134	.0408	.000217	.000136	.000275
370	.0224	.0044	.0449	.000302	.000071	.000369
10	.0304	.0044	.0465	.000329	.000071	.000400
20	.0307	.0044	.0498	.000321	.000071	.000402
30	.0332	.0044	.0501	.000335	.000071	.000426
40	.0356	.0044	.0512	.000344	.000071	.000441
50	.0404	.0044	.0568	.000390	.000071	.000519
380	.0693	.0044	.0653	.000400	.000071	.000537
381	.0851	.0044	.0667	.000401	.000071	.000538
277	.0142	.0179	.0373	.000273	.000094	.000282
274	.0140	.0194	.0369	.000264	.000091	.000253
273	.0139	.0207	.0364	.000255	.000094	.000224
280	.0131	.0234	.0344	.000224	.000126	.000140
281	.0130	.0251	.0314	.000201	.000134	.000071
282	.0109	.0257	.0317	.000203	.000135	.000068
283	.0110	.0248	.0264	.000181	.000174	.000062
284	.0087	.0231	.0247	.000161	.000191	.000096
291	.0047	.0213	.0218	.000144	.000200	.000121
292	.0074	.0134	.0161	.000133	.000205	.000145

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ALA RCL DBE 2+Y (SGLS4,SGUS2,RCPS61)

X-SHOCK - EAST/WEST DIRECTION, Z-SHOCK - NORTH/SOUTH DIRECTION
COORDINATE SYSTEM X ALONG HOT LEG, Y VERTICAL, Z BY RHR

NODE POINT	DEFLECTION (IN) X	Y	Z	ROTATION (RADIANS) X	Y	Z
1211	.0007	.0210	.0162	.000024	.000149	.000214
211	.0008	.0233	.0178	.000026	.000141	.000210
1212	.0008	.0236	.0180	.000026	.000140	.000209
212	.0009	.0261	.0197	.000028	.000128	.000200
213	.0009	.0284	.0212	.000030	.000111	.000188
214	.0010	.0294	.0219	.000031	.000103	.000180
1214	.0010	.0306	.0226	.000032	.000091	.000171
1231	.0021	.0375	.0146	.000057	.000101	.000011
1237	.0026	.0443	.0364	.000212	.000102	.000013
238	.0028	.0443	.0412	.000215	.000102	.000013
1238	.0041	.0447	.0697	.000228	.000102	.000014
1240	.0059	.0453	.1034	.000241	.000103	.000013
1269	.0076	.0464	.1312	.000248	.000152	.000106
370	.0081	.0851	.1401	.000928	.000397	.000283
10	.0084	.0910	.1462	.000961	.000397	.000297
20	.0086	.0960	.1485	.000965	.000397	.000298
30	.0094	.1030	.2047	.000994	.000397	.000309
40	.0096	.1086	.2069	.001014	.000397	.000315
50	.0097	.0951	.2353	.001114	.000397	.000351
380	.0072	.0951	.2561	.001137	.000397	.000359
381	.0070	.0951	.2557	.001139	.000397	.000360
277	.0291	.0964	.1308	.000854	.000466	.000261
278	.0293	.0967	.1279	.000835	.000491	.000254
279	.0296	.0969	.1245	.000814	.000515	.000247
280	.0342	.0976	.1138	.000742	.000583	.000226
281	.0301	.0979	.0949	.000661	.000639	.000203
282	.0274	.0979	.0791	.000655	.000641	.000202
283	.0283	.0976	.0874	.000562	.000668	.000185
284	.0221	.0979	.0739	.000517	.000689	.000166
291	.0191	.0964	.0632	.000484	.000677	.000153
292	.0154	.0955	.0511	.000401	.000657	.000137

WESTINGHOUSE FORM 652138

WESTINGHOUSE PWR SYSTEMS DIVISION
MECHANICS AND MATERIALS TECHNOLOGY

TITLE: ALA RCL DBE 2+Y MOMENTS AT AUXILIARY LINES				PAGE: 17
PROJECT: ALA-145	ENGR: [illegible]	DATE: 10/24/75	CHK: T. H. Lee	DATE: 10/24/75
			CHK: NR	DATE

ALS RCL DBE 2+Y (SSL34,SGUS2,RCPS5)

X-SHOCK - EAST/WEST DIRECTION, Z-SHOCK - NORTH/SOUTH DIRECTION
COORDINATE SYSTEM X ALONG HOT LEG, Y VERTICAL, Z BY RHR

NODE POINT	DEFLECTION (IN) X	Y	Z	ROTATION (RADIANS) X	Y	Z
1211	.0007	.0207	.0136	.000015	.000123	.000211
211	.0007	.0230	.0149	.000016	.000116	.000207
1212	.0007	.0232	.0151	.000016	.000115	.000206
212	.0008	.0257	.0165	.000017	.000104	.000197
213	.0008	.0280	.0177	.000019	.000090	.000185
214	.0009	.0290	.0183	.000019	.000082	.000178
1214	.0009	.0302	.0186	.000020	.000073	.000168
1231	.0021	.0369	.0122	.000038	.000093	.000010
1237	.0025	.0437	.0355	.000207	.000094	.000013
238	.0026	.0437	.0401	.000210	.000094	.000013
1238	.0027	.0440	.0579	.000222	.000094	.000014
1240	.0050	.0446	.1007	.000235	.000096	.000013
1205	.0211	.0282	.0516	.000245	.000077	.000117
376	.0424	.0334	.1156	.000706	.000126	.000263
10	.0477	.0356	.1332	.000738	.000126	.000277
20	.0479	.0364	.1397	.000741	.000126	.000278
30	.0494	.0384	.1365	.000763	.000126	.000288
40	.0519	.0384	.1419	.000781	.000126	.000295
50	.0540	.0384	.1537	.000863	.000126	.000331
360	.0554	.0384	.1407	.000882	.000126	.000339
361	.0552	.0384	.1361	.000883	.000126	.000339
277	.0325	.0064	.0905	.000657	.000190	.000235
276	.0370	.0067	.0492	.000541	.000223	.000226
278	.0315	.0071	.0377	.000625	.000249	.000217
280	.0295	.0078	.0819	.000572	.000326	.000149
281	.0288	.0082	.0737	.000512	.000395	.000162
282	.0285	.0092	.0732	.000503	.000369	.000160
283	.0239	.0080	.0557	.000460	.000439	.000142
284	.0207	.0074	.0563	.000404	.000470	.000123
291	.0183	.0068	.0444	.000364	.000452	.000111
292	.0153	.0059	.0404	.000316	.000482	.000098

WESTINGHOUSE FORM 552130

WESTINGHOUSE PWR SYSTEMS DIVISION
MECHANICS AND MATERIALS TECHNOLOGY

TITLE: ALA RCL DBE 2+Y MOMENTS AT AUXILIARY LINES
PROJECT: ALA-1415
ENGR: R PARIS 10/21/75
CHK: T.H. Fus 10/24/75
CHK: NR
PAGE: 18
DATE

TITLE: ALA RCL DBE 3-Y MOVEMENTS AT AUXILIARY LINES | PAGE: 19
PROJECT: ALA-1115 | ENGR.: N. Mishra 10/31/75 | DATE | CHK.: T. H. Lee 10/31/75 | DATE | DATE

ALA RCL DBE Z+Y (SSLSS,SGUS2,RCPSS)

X-SHOCK - EAST/WEST DIRECTION, Z-SHOCK - NORTH/SOUTH DIRECTION
COORDINATE SYSTEM X ALONG HOT LEG, Y VERTICAL, Z BY RHR

NODE POINT	DEFLECTION (IN) X	Y	Z	ROTATION (RADIANS) X	Y	Z
1211	.0006	.0197	.0021	.000003	.000020	.000201
211	.0007	.0219	.0023	.000009	.000019	.000197
1212	.0007	.0221	.0024	.000009	.000019	.000196
212	.0008	.0244	.0026	.000010	.000017	.000188
213	.0008	.0266	.0028	.000010	.000015	.000176
214	.0008	.0276	.0029	.000011	.000014	.000169
1214	.0009	.0287	.0030	.000011	.000013	.000160
1231	.0023	.0351	.0029	.000013	.000017	.000009
1237	.0017	.0416	.0459	.000269	.000018	.000011
238	.0016	.0416	.0520	.000274	.000018	.000011
1238	.0016	.0419	.0486	.000293	.000019	.000012
1240	.0021	.0423	.1375	.000314	.000021	.000011
1265	.0204	.0196	.0506	.000239	.000073	.000137
376	.0422	.0200	.2177	.000702	.000119	.000280
1	.0411	.0203	.1530	.000733	.000119	.000295
20	.0411	.0203	.1334	.000736	.000119	.000297
30	.0502	.0205	.1384	.000760	.000119	.000309
40	.0591	.0209	.1421	.000773	.000119	.000316
50	.0659	.0231	.1344	.000353	.000119	.000357
380	.0675	.0231	.1319	.000372	.000119	.000366
381	.0705	.0231	.1345	.000372	.000119	.000366
277	.0314	.0079	.0852	.000654	.000193	.000245
278	.0313	.0065	.0869	.000638	.000217	.000234
279	.0306	.0090	.0855	.000622	.000243	.000223
280	.0298	.0102	.0798	.000584	.000319	.000191
281	.0290	.0107	.0717	.000561	.000367	.000162
282	.0294	.0107	.0717	.000563	.000390	.000160
283	.0233	.0105	.0559	.000457	.000429	.000142
284	.0202	.0098	.0540	.000401	.000459	.000128
291	.0178	.0090	.0476	.000361	.000475	.000116
292	.0149	.0078	.0391	.000313	.000469	.000107

WESTINGHOUSE FORM 65213B

ALA RPV SEISMIC MOTION +X/+Y (4/2/6)

ALA RCL DISPLACEMENTS AT AUX LINE NOZZLES DUE TO RPV SEISMIC MOTION
COORDINATE SYSTEM X ALONG HOT LEG, Y VERTICAL, Z BY RHR

NODE POINT	DEFLECTION (IN) X	Y	Z	ROTATION (RADIANS) X	Y	Z
1211	.0418	.0067	-.0009	.000003	-.000010	-.000028
211	.0417	.0071	-.0010	.000004	-.000010	-.000021
1212	.0417	.0071	-.0010	.000004	-.000010	-.000020
212	.0417	.0074	-.0011	.000004	-.000009	-.000011
213	.0416	.0075	-.0012	.000004	-.000009	-.000001
214	.0416	.0076	-.0013	.000005	-.000009	.000005
1214	.0416	.0076	-.0013	.000005	-.000008	.000011
1231	.0314	-.0004	-.0011	.000007	-.000002	.000102
1237	-.0183	-.0004	.0007	.000004	-.000002	.000111
238	-.0207	-.0004	.0008	.000004	-.000002	.000111
1238	-.0342	-.0004	.0012	.000004	-.000002	.000111
1240	-.0492	-.0004	.0017	.000003	-.000004	.000110
1265	.0433	-.0050	-.0135	-.000018	-.000102	.000038
376	.0300	-.0000	-.0273	-.000096	-.000164	.000028
10	.0294	-.0000	-.0295	-.000096	-.000164	.000028
20	.0294	-.0000	-.0296	-.000096	-.000164	.000028
30	.0292	-.0000	-.0303	-.000096	-.000164	.000028
40	.0290	-.0000	-.0307	-.000096	-.000164	.000028
50	.0283	-.0000	-.0334	-.000096	-.000164	.000028
390	.0277	-.0000	-.0354	-.000096	-.000164	.000028
391	.0274	-.0000	-.0362	-.000096	-.000164	.000028
277	.0342	-.0002	-.0146	-.000089	-.000150	.000029
278	.0346	-.0002	-.0138	-.000087	-.000145	.000029
279	.0349	-.0002	-.0130	-.000084	-.000139	.000029
290	.0359	-.0001	-.0106	-.000076	-.000122	.000030
291	.0369	.0001	-.0083	-.000067	-.000104	.000030
292	.0370	.0001	-.0082	-.000066	-.000103	.000030
293	.0377	.0003	-.0066	-.000059	-.000089	.000029
294	.0385	.0005	-.0051	-.000051	-.000075	.000028
291	.0389	.0007	-.0042	-.000045	-.000066	.000027
292	.0395	.0009	-.0032	-.000038	-.000056	.000025

WESTINGHOUSE FORM 662138

WESTINGHOUSE PWR SYSTEMS DIVISION
MECHANICS AND MATERIALS TECHNOLOGY

TITLE: ALA RCL MOVEMENTS DUE TO RPV +X/+Y SEISMIC MOTION
PROJECT: ALA-1115
ENGR: R. WANZ 10/21/75
CHK: T. H. Liu 10/21/75
CHK: NP
DATE:
PAGE: 20

ALA RPV SEISMIC MOTION +X/+Y (4/2/75)

ALA RCL DISPLACEMENTS AT AUX LINE NOZZLES DUE TO RPV SEISMIC MOTION
COORDINATE SYSTEM X ALONG HOT LEG, Y VERTICAL, Z BY RHR

NODE POINT	DEFLECTION (IN) X	Y	Z	ROTATION (RADIANS) X	Y	Z
1211	.0417	.0067	.0012	-.000000	.000010	-.000027
211	.0416	.0071	.0013	-.000000	.000009	-.000021
1212	.0416	.0071	.0013	-.000000	.000009	-.000020
212	.0415	.0074	.0014	-.000000	.000007	-.000011
213	.0415	.0075	.0015	-.000000	.000006	-.000000
214	.0415	.0076	.0016	-.000000	.000005	.000005
1214	.0414	.0076	.0016	-.000000	.000003	.000012
1231	.0312	-.0005	.0005	-.000002	.000015	.000101
1237	-.0181	-.0005	-.0004	-.000003	-.000015	.000110
238	-.0205	-.0005	-.0005	-.000003	-.000015	.000110
1239	-.0339	-.0005	-.0009	-.000003	-.000015	.000110
1240	-.0488	-.0005	-.0012	-.000003	-.000017	.000109
1265	.0407	-.0009	.0025	-.000011	-.000031	.000027
376	.0382	.0000	.0032	.000005	.000066	.000008
10	.0380	.0000	.0033	.000005	.000066	.000008
20	.0380	.0000	.0033	.000005	.000066	.000008
30	.0380	.0000	.0033	.000005	.000066	.000008
40	.0379	.0000	.0033	.000005	.000066	.000008
50	.0377	.0000	.0035	.000005	.000066	.000008
390	.0376	.0000	.0036	.000005	.000066	.000009
391	.0375	.0000	.0037	.000005	.000066	.000008
277	.0376	.0006	-.0008	.000005	.000054	.000008
278	.0376	.0006	-.0011	.000005	.000049	.000008
279	.0376	.0007	-.0014	.000005	.000044	.000009
290	.0376	.0009	-.0022	.000005	.000030	.000007
291	.0378	.0011	-.0027	.000004	.000015	.000007
292	.0378	.0011	-.0027	.000004	.000015	.000007
293	.0381	.0012	-.0029	.000004	.000005	.000007
294	.0384	.0014	-.0030	.000004	-.000005	.000006
291	.0386	.0015	-.0029	.000003	-.000011	.000006
292	.0390	.0016	-.0027	.000003	-.000016	.000005

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WESTINGHOUSE PWR SYSTEMS DIVISION
MECHANICS AND MATERIALS TECHNOLOGY

TITLE		PAGE
ALA RCL MOVEMENTS DUE TO RPV +X/+Y SEISMIC MOTION		21
PROJECT ALA-1415	ENGR. N. Ihnat DATE 10/21/75	CHK. T. H. Lee DATE 10/21/75

WESTINGHOUSE PWR SYSTEMS DIVISION
MECHANICS AND MATERIALS TECHNOLOGY

TITLE: ALA RCL MOVEMENTS DUE TO RPV +X/+Y SEISMIC MOTION
PROJECT: ALA-1145
ENGR. R MANZ 10/21/75
CHK. H. Gus 10/24/75 NR
PAGE 22
DATE

ALA RPV SEISMIC MOTION +X/+Y (5/2/5)

ALA RCL DISPLACEMENTS AT AUX LINE NOZZLES DUE TO RPV SEISMIC MOTION
COORDINATE SYSTEM X ALONG HOT LEG, Y VERTICAL, Z BY RHR

NODE POINT	DEFLECTION (IN) X	Y	Z	ROTATION (RADIANS) X	Y	Z
1211	.0416	.0067	.0003	.000000	.000002	-.000028
211	.0416	.0071	.0003	.000000	.000002	-.000021
1212	.0416	.0071	.0003	.000000	.000002	-.000020
212	.0415	.0074	.0004	.000000	.000002	-.000011
213	.0415	.0075	.0004	.000000	.000001	-.000000
214	.0414	.0076	.0004	.000000	.000001	.000005
1214	.0414	.0076	.0004	.000000	.000000	.000012
1231	.0312	-.0005	.0000	-.000000	-.000005	.000101
1237	-.0181	-.0005	-.0001	-.000001	-.000005	.000110
239	-.0204	-.0005	-.0001	-.000001	-.000005	.000110
1239	-.0339	-.0005	-.0002	-.000001	-.000005	.000110
1240	-.0487	-.0005	-.0004	-.000002	-.000007	.000109
1245	.0410	-.0009	.0022	-.000011	-.000033	.000026
376	.0382	-.0000	.0030	.000006	.000065	.000009
10	.0380	-.0000	.0032	.000006	.000065	.000009
20	.0379	-.0000	.0032	.000006	.000065	.000009
30	.0377	-.0000	.0032	.000006	.000065	.000009
40	.0376	-.0000	.0032	.000006	.000065	.000009
50	.0376	-.0000	.0034	.000006	.000065	.000009
390	.0374	-.0000	.0035	.000006	.000065	.000009
391	.0373	-.0000	.0036	.000006	.000065	.000009
277	.0376	.0006	-.0009	.000006	.000053	.000008
278	.0375	.0007	-.0012	.000006	.000048	.000008
279	.0376	.0007	-.0015	.000006	.000043	.000008
290	.0376	.0009	-.0022	.000005	.000029	.000008
291	.0378	.0011	-.0027	.000005	.000015	.000007
292	.0378	.0011	-.0028	.000005	.000014	.000007
293	.0381	.0013	-.0030	.000004	.000004	.000007
294	.0384	.0014	-.0030	.000004	-.000005	.000006
291	.0386	.0015	-.0029	.000004	-.000011	.000005
292	.0390	.0016	-.0027	.000003	-.000017	.000005

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WESTINGHOUSE PWR SYSTEMS DIVISION
MECHANICS AND MATERIALS TECHNOLOGY

TITLE: ALA RCL MOVEMENTS DUE TO RPV +Z/+Y SEISMIC MOTION | PAGE: 23

PROJECT: ALA-1115 | ENGR: R. MAINE 10/21/75 | CHK: T. H. Lin 10/24/75 NR | DATE

ALA RPV SEISMIC MOTION +Z/+Y (4/2/6)

ALA RCL DISPLACEMENTS AT AUX LINE NOZZLES DUE TO RPV SEISMIC MOTION
COORDINATE SYSTEM X ALONG HOT LEG, Y VERTICAL, Z BY RHR

NODE POINT	DEFLECTION (IN) X	Y	Z	ROTATION (RADIANS) X	Y	Z
1211	.0001	.0008	.0284	-.000017	-.000166	.000012
211	.0001	.0007	.0266	-.000018	-.000169	.000012
1212	.0001	.0007	.0264	-.000018	-.000169	.000012
212	.0002	.0005	.0244	-.000020	-.000169	.000011
213	.0002	.0004	.0224	-.000021	-.000167	.000010
214	.0002	.0003	.0215	-.000022	-.000166	.000010
1214	.0002	.0003	.0204	-.000023	-.000163	.000009
1231	.0001	-.0000	.0051	-.000020	-.000098	.000001
1237	-.0003	-.0000	-.0034	-.000019	-.000097	.000001
238	-.0004	-.0000	-.0039	-.000019	-.000097	.000001
1239	-.0005	-.0000	-.0062	-.000019	-.000097	.000001
1240	-.0007	-.0000	-.0088	-.000019	-.000096	.000001
1265	-.0058	.0024	.0122	.000012	-.000048	.000003
376	-.0063	.0001	.0208	.000048	-.000064	-.000016
10	-.0059	.0001	.0219	.000048	-.000064	-.000016
20	-.0059	.0001	.0220	.000048	-.000064	-.000016
30	-.0059	.0001	.0223	.000048	-.000064	-.000016
40	-.0057	.0001	.0225	.000048	-.000064	-.000016
50	-.0052	.0001	.0239	.000048	-.000064	-.000016
390	-.0049	.0001	.0249	.000048	-.000064	-.000016
391	-.0047	.0001	.0253	.000048	-.000064	-.000016
277	-.0056	.0001	.0230	.000046	-.000074	-.000013
278	-.0055	.0001	.0235	.000045	-.000078	-.000012
279	-.0053	.0001	.0240	.000044	-.000081	-.000011
290	-.0049	.0002	.0257	.000041	-.000090	-.000008
291	-.0042	.0004	.0279	.000037	-.000098	-.000005
292	-.0042	.0004	.0280	.000037	-.000098	-.000004
293	-.0036	.0005	.0298	.000034	-.000101	-.000002
294	-.0030	.0008	.0319	.000031	-.000101	-.000000
295	-.0026	.0009	.0334	.000028	-.000099	.000001
297	-.0021	.0011	.0352	.000025	-.000095	.000002

WESTINGHOUSE FORM 652138

ALA RPV SEISMIC MOTION +Z/+Y (4/2/5)

ALA RCL DISPLACEMENTS AT AUX LINE NOZZLES DUE TO RPV SEISMIC MOTION
COORDINATE SYSTEM X ALONG HOT LEG, Y VERTICAL, Z BY RHR

NODE POINT	DEFLECTION (IN) X	Y	Z	ROTATION (RADIANS) X	Y	Z
1211	.0002	.0008	.0276	-.000015	-.000174	.000012
211	.0002	.0007	.0257	-.000016	-.000176	.000012
1212	.0002	.0007	.0255	-.000017	-.000176	.000012
212	.0002	.0005	.0234	-.000018	-.000176	.000011
213	.0002	.0004	.0214	-.000019	-.000173	.000010
214	.0002	.0003	.0204	-.000020	-.000171	.000010
1214	.0002	.0003	.0194	-.000021	-.000168	.000009
1231	.0002	-.0000	.0045	-.000016	-.000093	.000002
1237	-.0004	-.0000	-.0030	-.000017	-.000093	.000001
238	-.0004	-.0000	-.0034	-.000017	-.000093	.000001
1239	-.0006	-.0000	-.0054	-.000017	-.000093	.000001
1240	-.0005	-.0000	-.0077	-.000016	-.000092	.000001
1255	-.0051	.0008	.0058	.000008	-.000075	.000007
375	-.0095	.0001	.0087	.000008	-.000146	-.000009
17	-.0095	.0001	.0089	.000008	-.000146	-.000009
20	-.0096	.0001	.0089	.000008	-.000146	-.000009
30	-.0095	.0001	.0090	.000008	-.000146	-.000009
40	-.0095	.0001	.0090	.000008	-.000146	-.000009
50	-.0092	.0001	.0092	.000008	-.000146	-.000009
390	-.0090	.0001	.0094	.000008	-.000146	-.000009
391	-.0089	.0001	.0095	.000008	-.000146	-.000009
277	-.0074	-.0002	.0171	.000009	-.000149	-.000006
278	-.0071	-.0002	.0180	.000009	-.000148	-.000004
279	-.0068	-.0002	.0188	.000009	-.000149	-.000003
290	-.0060	-.0002	.0217	.000009	-.000148	.000001
291	-.0050	-.0000	.0250	.000010	-.000144	.000004
292	-.0049	.0000	.0252	.000010	-.000144	.000005
293	-.0042	.0002	.0277	.000010	-.000139	.000007
294	-.0034	.0004	.0305	.000009	-.000132	.000009
231	-.0023	.0006	.0323	.000009	-.000125	.000010
232	-.0022	.0008	.0345	.000008	-.000115	.000010

WESTINGHOUSE FORM 652138

WESTINGHOUSE PWR SYSTEMS DIVISION
MECHANICS AND MATERIALS TECHNOLOGY

TITLE	ALA RCL MOVEMENTS DUE TO RPV +Z/+Y SEISMIC MOTION			PAGE 2 of
PROJECT ALA-1415	ENGR. R MANZ	DATE 10/31/75	CHK. T. H. Thu	DATE 10/31/75
			CHK. NR	DATE

ALA RPV SEISMIC MOTION +Z/+Y (5/2/5)

ALA RCL DISPLACEMENTS AT AUX LINE NOZZLES DUE TO RPV SEISMIC MOTION
COCROINATE SYSTEM X ALONG HOT LEG, Y VERTICAL, Z BY RHR

NODE POINT	DEFLECTION (IN) X	Y	Z	ROTATION (RADIANS) X	Y	Z
1211	.0001	.0008	.0211	-.000013	-.000129	.000012
211	.0001	.0007	.0186	-.000015	-.000227	.000012
1212	.0001	.0007	.0183	-.000015	-.000226	.000012
212	.0001	.0006	.0156	-.000016	-.000219	.000011
213	.0001	.0004	.0130	-.000017	-.000208	.000010
214	.0001	.0004	.0119	-.000018	-.000202	.000010
1214	.0001	.0003	.0106	-.000018	-.000193	.000009
1231	.0001	-.0000	.0004	-.000004	-.000026	.000001
1237	-.0002	-.0000	-.0003	-.000002	-.000026	.000001
238	-.0002	-.0000	-.0004	-.000002	-.000026	.000001
1239	-.0003	-.0000	-.0006	-.000002	-.000026	.000001
1240	-.0003	-.0000	-.0008	-.000002	-.000026	.000001
1245	-.0036	.0007	.0032	.000002	-.000088	-.000000
378	-.0103	.0000	.0075	.000015	-.000156	-.000003
10	-.0103	.0000	.0078	.000015	-.000156	-.000003
20	-.0103	.0000	.0078	.000015	-.000156	-.000003
30	-.0102	.0000	.0079	.000015	-.000156	-.000003
40	-.0102	.0000	.0080	.000015	-.000156	-.000003
50	-.0101	.0000	.0084	.000015	-.000156	-.000003
390	-.0101	.0000	.0087	.000015	-.000156	-.000003
391	-.0100	.0000	.0089	.000015	-.000156	-.000003
277	-.0075	.0001	.0162	.000015	-.000157	-.000001
278	-.0073	.0002	.0171	.000015	-.000157	-.000001
279	-.0070	.0002	.0180	.000014	-.000157	-.000000
290	-.0061	.0003	.0211	.000014	-.000155	.000002
291	-.0051	.0005	.0245	.000013	-.000151	.000004
292	-.0050	.0005	.0247	.000013	-.000151	.000004
293	-.0042	.0006	.0273	.000012	-.000145	.000005
294	-.0034	.0008	.0302	.000011	-.000136	.000006
241	-.0029	.0010	.0321	.000011	-.000129	.000007
292	-.0022	.0012	.0343	.000010	-.000118	.000007

WESTINGHOUSE FORM 552138

WESTINGHOUSE PWR SYSTEMS DIVISION
MECHANICS AND MATERIALS TECHNOLOGY

TITLE: ALA RCL MOMENTS DUE TO RPV +Z/+Y SEISMIC MOTION
PROJECT: ALA-1455
ENGR: R MAHR 10/21/75
CHK: T. H. Liu 10/24/75 NR
PAGE: 25
DATE

MAIN STEAM LOOP 'A' FREQUENCIES AND MODE SHAPES

FROM ORIGINAL DESIGN ANALYSIS.

(USE STRESS ISONETRIC FOR CORRELATION

OF DDOF AND EXTERNAL JOINT.)

SEISMIC ANALYSIS

NUMBER OF EARTHQUAKES	: 1
SYNTHESIS CODE	: MEMBER FORCE SUPERPOSITION
SOLUTION PROCEDURE	: STIFFNESS MATRIX - GIVENS METHOD
NUMBER OF DYN. DEGREES OF FREEDOM	: 48
NUMBER OF MODES SPECIFIED IN INPUT	: 20
LEAST SIGNIFICANT PERIOD SPECIFIED	: 0.025

DYNAMIC MODEL

CORRESPONDENCE TABLE

INTERNAL DYNAMIC DEGREES OF FREEDOM	EXTERNAL JOINT		DIRECTION	MASSES COMPUTED WEIGHT (LB)	ADDITIONAL WEIGHT (LB)	TOTAL WEIGHT (LB)	TOTAL MASS (LB-SEC**2/IN)
1	20	TNGT	X	3567.1945		3567.1945	9.2319
2	20	TNGT	Y	3567.1945		3567.1945	9.2319
3	20	TNGT	Z	3567.1945		3567.1945	9.2319
4	35	TNGT	X	3880.9569		3880.9569	10.0439
5	35	TNGT	Y	3880.9569		3880.9569	10.0439
6	35	TNGT	Z	3880.9569		3880.9569	10.0439
7	50	TNGT	X	2226.8022		2226.8022	5.7629
8	50	TNGT	Y	2226.8022		2226.8022	5.7629
9	50	TNGT	Z	2226.8022		2226.8022	5.7629
10	55	TNGT	X	2226.8022		2226.8022	5.7629
11	55	TNGT	Y	2226.8022		2226.8022	5.7629
12	55	TNGT	Z	2226.8022		2226.8022	5.7629
13	60	TNGT	X	3352.9732		3352.9732	8.6775
14	60	TNGT	Y	3352.9732		3352.9732	8.6775
15	60	TNGT	Z	3352.9732		3352.9732	8.6775
16	80	TNGT	X	3115.2660		3115.2660	8.0623
17	80	TNGT	Y	3115.2660		3115.2660	8.0623
18	80	TNGT	Z	3115.2660		3115.2660	8.0623
19	90	TNGT	X	4297.7714		4297.7714	11.1226
20	90	TNGT	Y	4297.7714		4297.7714	11.1226
21	90	TNGT	Z	4297.7714		4297.7714	11.1226
22	105	TNGT	X	3377.1388		3377.1388	8.7400
23	105	TNGT	Y	3377.1388		3377.1388	8.7400
24	110	TNGT	X	1372.0012		1372.0012	3.5507
25	110	TNGT	Z	1372.0012		1372.0012	3.5507

CORRESPONDENCE TABLE

MASSES

INTERNAL DYNAMIC DEGREES OF FREEDOM	EXTERNAL JOINT		DIRECTION	COMPUTED WEIGHT (LB)	ADDITIONAL WEIGHT (LB)	TOTAL WEIGHT (LB)	TOTAL MASS (LB-SEC**2/IN)
26	115	TNGT	X	1176.0010		1176.0010	3.0435
27	115	TNGT	Y	1176.0010		1176.0010	3.0435
28	115	TNGT	Z	1176.0010		1176.0010	3.0435
29	120	TNGT	Y	1994.7133		1994.7133	5.1623
30	120	TNGT	Z	1994.7133		1994.7133	5.1623
31	125	TNGT	X	2813.4256		2813.4256	7.2811
32	125	TNGT	Y	2813.4256		2813.4256	7.2811
33	125	TNGT	Z	2813.4256		2813.4256	7.2811
34	130	TNGT	X	2891.6102		2891.6102	7.4835
35	130	TNGT	Y	2891.6102		2891.6102	7.4835
36	130	TNGT	Z	2891.6102		2891.6102	7.4835
37	140	TNGT	X	3907.2997		3907.2997	10.1121
38	140	TNGT	Y	3907.2997		3907.2997	10.1121
39	140	TNGT	Z	3907.2997		3907.2997	10.1121
40	160	TNGT	X	3696.4035		3696.4035	9.5663
41	160	TNGT	Y	3696.4035		3696.4035	9.5663
42	160	TNGT	Z	3696.4035		3696.4035	9.5663
43	165	TNGT	X	2897.5068	20.0000	2917.5068	7.5505
44	165	TNGT	Y	2897.5068	20.0000	2917.5068	7.5505
45	165	TNGT	Z	2897.5068	20.0000	2917.5068	7.5505
46	45	TNGT	X	2889.0083		2889.0083	7.4767
47	45	TNGT	Y	2889.0083		2889.0083	7.4767
48	45	TNGT	Z	2889.0083		2889.0083	7.4767

MASS-POINTS EXCLUDED DUE TO POSITION AT SUPPORT OR NEGLIGIBLE MASS : 10 ANCH
75 TNGT
180 ANCH

TITLE I FARLEY UNIT NO.2 MAIN STEAM (ISSUE-01) DEC 19, 1' 04-27 P.M.
PROBLE. .UMBER I 501
PROJECT NUMBER I 7597
GROUP I JAG

EIGENVALUES (CIRCULAR FREQUENCY IN RADIANS PER SECOND)

60.8417015	93.5050249	97.8084717	146.1608601	175.7026787	206.2081127	213.6283836	243.5032902
256.2654953	274.1343575	405.7765961	411.1515732	433.1599655	468.9055328	482.3805084	511.7106476
537.0630646	635.1146317	646.2241211	689.1996536	693.5600586	749.5431137	755.5568466	825.7088928
846.5415726	1001.0371780	1013.3184891	1088.1020966	1104.0574951	1172.2489319	1458.8297119	1530.9331970
1542.8413696	1707.0943756	1897.4890900	1944.0281830	2097.5161743	2604.6568604	2945.3573914	2987.2079468
3169.9575806	3276.2178040	3285.8692627	3538.3937073	4047.0463867	4844.6939819	7813.5890503	79057.5517578

FREQUENCY IN CYCLES PER SECOND

9.6832657	14.8817995	15.5667149	23.2622430	27.9639735	32.8190680	34.0000420	38.7547851
40.7859550	43.6298747	64.5814056	65.4368601	68.9396076	74.6286964	76.7733068	81.4413481
85.4763136	101.0817184	102.8498497	109.6896248	110.3836050	119.2935925	120.2507086	131.4157619
134.7313900	159.3201504	161.2747822	173.1769733	175.7163563	186.5693703	232.1801567	243.6557922
245.5510387	271.6927376	301.9950218	309.4019547	333.8303490	414.5443649	468.7685852	475.4293137
504.5148430	521.4266968	522.9627762	563.1533279	644.1079788	771.0894775	1243.5723724	12582.4107666

PERIOD IN SECONDS

0.1032709	0.0671962	0.0642396	0.0429881	0.0357603	0.0304701	0.0294117	0.0258033
0.0245182	0.0229201	0.0154843	0.0152819	0.0145054	0.0133997	0.0130254	0.0122788
0.0116991	0.0098930	0.0097229	0.0091166	0.0090593	0.0083827	0.0083160	0.0076094
0.0074222	0.0062767	0.0062006	0.0057744	0.0056910	0.0053599	0.0043070	0.0041042
0.0040725	0.0036806	0.0033113	0.0032320	0.0029955	0.0024123	0.0021332	0.0021034
0.0019821	0.0019178	0.0019122	0.0017757	0.0015525	0.0012969	0.0008041	0.0000795

***** THE LEAST SIGNIFICANT PERIOD IS 0.026

TITLE : FARLEY UNIT NO.2 MAIN STEAM (ISSUE-01)
PROBLEM NUMBER : 501
PROJECT NUMBER : 7597
GROUP : JAG

INTERNAL DEGREE OF FREEDOM	DIRECTION	MODE 1	MODE 2	MODE 3	MODE 4	MODE 5	MODE 6	MODE 7	MODE 8
1	X	-0.00008	-0.00883	0.02117	-0.11517	0.13965	0.03369	-0.09108	0.39329
2	Y	0.00452	-0.03395	0.34906	0.02051	-0.39889	-0.07653	-0.08573	-0.09172
3	Z	0.00018	0.01042	-0.02455	0.14673	-0.18500	-0.04434	0.11625	-0.50858
4	X	-0.00542	-0.03695	-0.10894	-0.52630	0.42854	0.06430	-0.27502	0.68210
5	Y	0.01248	-0.07517	0.92048	0.14815	-0.98539	-0.17634	-0.15188	-0.22776
6	Z	0.00125	0.03571	-0.15075	0.36991	-0.29760	-0.06427	0.24040	-0.81620
7	X	-0.00172	-0.01230	0.01081	0.01442	-0.03724	0.02018	0.12201	0.09460
8	Y	0.02150	-0.09472	0.99429	-0.14307	0.31718	0.10441	0.00310	0.30404
9	Z	0.01142	0.07205	0.08003	0.71209	0.13540	0.11333	0.38280	0.25216
10	X	0.00209	0.01316	0.03375	0.26645	0.02509	0.06516	0.26695	0.19708
11	Y	0.02336	-0.09034	0.87656	-0.23165	0.82369	0.18250	0.15195	0.07323
12	Z	0.01519	0.09752	0.10173	0.95749	0.19862	0.15758	0.51976	0.36549
13	X	0.00391	0.02577	0.03349	0.31767	0.05968	0.06452	0.23281	0.17045
14	Y	0.02113	-0.06371	0.64404	-0.24061	1.00000	0.17215	0.21362	-0.24360
15	Z	0.01696	0.11003	0.10014	1.00000	0.23334	0.15566	0.47601	0.34833
16	X	-0.00164	0.00001	0.00036	-0.00015	0.00029	0.00615	-0.00080	-0.00147
17	Y	-0.01837	-0.00279	-0.13449	0.07370	-0.47815	0.08310	-0.11436	0.84332
18	Z	-0.02483	-0.16349	-0.04288	-0.56313	-0.26719	0.03574	0.50741	-0.04593
19	X	-0.00361	0.00002	0.00078	-0.00032	0.00064	0.01351	-0.00177	-0.00322
20	Y	-0.03240	-0.00229	-0.11172	0.06643	-0.46637	0.16459	-0.13469	1.00000
21	Z	-0.04104	-0.34649	-0.05247	-0.69308	-0.39208	0.10778	1.00000	0.03606
22	X	-0.05721	-0.00046	-0.02526	0.01752	-0.14628	0.21661	-0.06664	0.31051
23	Y	0.00006	-0.00002	-0.00077	0.00050	-0.00363	0.00045	-0.00103	0.00958
24	X	-0.06332	-0.00025	-0.01529	0.01135	-0.10242	0.21854	-0.05487	0.19028
25	Z	-0.00257	0.31931	0.03165	0.00055	0.03062	-0.01244	-0.19573	-0.10891
26	X	-0.04524	-0.00010	-0.00694	0.00552	-0.05347	0.14672	-0.03245	0.08329
27	Y	0.00000	-0.00006	-0.00000	-0.00016	-0.00018	0.00009	0.00149	0.00152
28	Z	-0.00406	0.54030	0.05443	-0.03558	0.02931	-0.01593	-0.26066	-0.16976
29	Y	0.00000	-0.00012	-0.00001	-0.00033	-0.00036	0.00017	0.00298	0.00304
30	Z	-0.00515	0.73031	0.07455	-0.09064	0.01244	-0.01492	-0.25843	-0.20152
31	X	0.24418	-0.00020	0.00180	-0.00602	0.09744	-0.62528	0.09841	0.05211
32	Y	0.00000	-0.00026	-0.00002	-0.00072	-0.00079	0.00037	0.00652	0.00664
33	Z	-0.00624	1.00000	0.10453	-0.23719	-0.05963	0.00033	-0.04711	-0.14426
34	X	0.59535	-0.00076	-0.00966	-0.00637	0.11538	-0.95879	0.13613	0.19302
35	Y	0.00001	-0.00040	-0.00003	-0.00111	-0.00121	0.00057	0.01000	0.01016
36	Z	-0.00540	0.94994	0.10095	-0.30849	-0.11837	0.01967	0.25612	0.04402
37	X	1.00000	-0.00152	-0.02916	-0.00629	0.03381	-0.55387	0.06086	0.21025
38	Y	0.00001	-0.00055	-0.00004	-0.00151	-0.00164	0.00078	0.01355	0.01372
39	Z	-0.00304	0.58441	0.06302	-0.24149	-0.11521	0.02745	0.40689	0.21662
40	X	0.90887	-0.00200	-0.04072	-0.05763	-0.16664	1.00000	-0.10005	-0.20812
41	Y	-0.00079	0.16778	0.01839	-0.08779	-0.04972	0.01468	0.23098	0.16338
42	Z	-0.00044	0.10373	0.01154	-0.06484	-0.04012	0.01285	0.20587	0.15601
43	X	0.40007	-0.00096	-0.02011	-0.03321	-0.11697	0.83132	-0.08947	-0.21431
44	Y	-0.00057	0.12959	0.01433	-0.07604	-0.04602	0.01456	0.23288	0.17628
45	Z	-0.00042	0.09989	0.01111	-0.06250	-0.03874	0.01244	0.19955	0.15182
46	X	-0.00659	-0.04212	-0.03518	-0.35111	-0.08550	-0.04667	-0.13355	-0.07269
47	Y	0.01696	-0.08390	1.00000	0.00440	-0.39806	-0.03900	-0.16295	0.31926
48	Z	0.00659	0.04212	0.03518	0.35111	0.08550	0.04667	0.13356	0.07269
		9.7 ~	14.9 ~	15.6 ~	23.3 ~	28. ~	32.8	34 ~	38.8 ~

***** THE NUMBER OF MODES WAS LIMITED BY THE LEAST SIGNIFICANT PERIOD OF 0.025 SECONDS
***** THE NUMBER OF MODES IS 8

ORTHOGONALITY CHECK OF EIGENVECTORS
(UPPER TRIANGLE OF THE SYMMETRICAL MATRIX)

1	2	3	4	5	6	7	8
0.10000E 01	-0.22725E-08	0.88151E-08	-0.42127E-08	-0.93021E-08	0.25809E-07	-0.53270E-08	-0.10305E-08
	0.10000E 01	0.13130E-05	-0.30322E-07	-0.79775E-07	-0.51164E-09	0.13861E-07	-0.27589E-07
		0.10000E 01	0.70513E-07	-0.56618E-07	-0.16450E-07	-0.22352E-07	0.24092E-08
			0.10000E 01	-0.59224E-06	0.19115E-07	0.45000E-07	0.30654E-07
				0.10000E 01	-0.96111E-07	0.20077E-06	-0.35104E-06
					0.10000E 01	0.22953E-06	-0.13223E-06
						0.10000E 01	-0.69222E-07
							0.10000E 01

Westinghouse Electric Corporation
Water Reactor Divisions

Nuclear Technology Division
Box 355
Pittsburgh Pennsylvania 15230

February 25, 1980
AM-RCSA-809
S.O. APR/145
Ref:(1)LSF-NS-811,2/11/80

Mr. A. Vizzi
Project Engineer
Bechtel Power Corporation
15740 Shady Grove Road
Gaithersburg, MD 20760

Dear Mr. Vizzi:

JOSEPH M. FARLEY NUCLEAR PLANT
Steam Generator Model

A model of the steam generator is transmitted for use in the NRC evaluation of Farley Unit 2 main steam line to Loop 1. The model includes the following:

1. A lumped mass stick model represented by pipe elements.

2. A stiffness matrix representation of the reactor coolant loop piping at the steam generator centerline.

3. Stiffnesses of the lower and upper steam generator supports. Two cases for the lower support stiffness are given because of the non-linearity of the support bumpers. Both cases should be considered in separate seismic analyses. The support column stiffness is included in the lower support stiffness matrix for both cases.

The stiffness matrices of Items (2) & (3) above are defined in the following coordinate system:

+X North
+Y Up
+Z East

This information satisfies the request of Southern Company Services in the above referenced letter.

If you have any questions, please call.

Sincerely,

J. L. Vota, Manager
Southern Company Projects

R.W.Manz/jm
CC:(See distribution on next page)

APW-A-5149
AM-RCSA-809

A. Vizzi

cc: A. Vizzi, 1L, 1A
F. E. Ehrensperger, 1L
F. G. Doar, 1L, 1A
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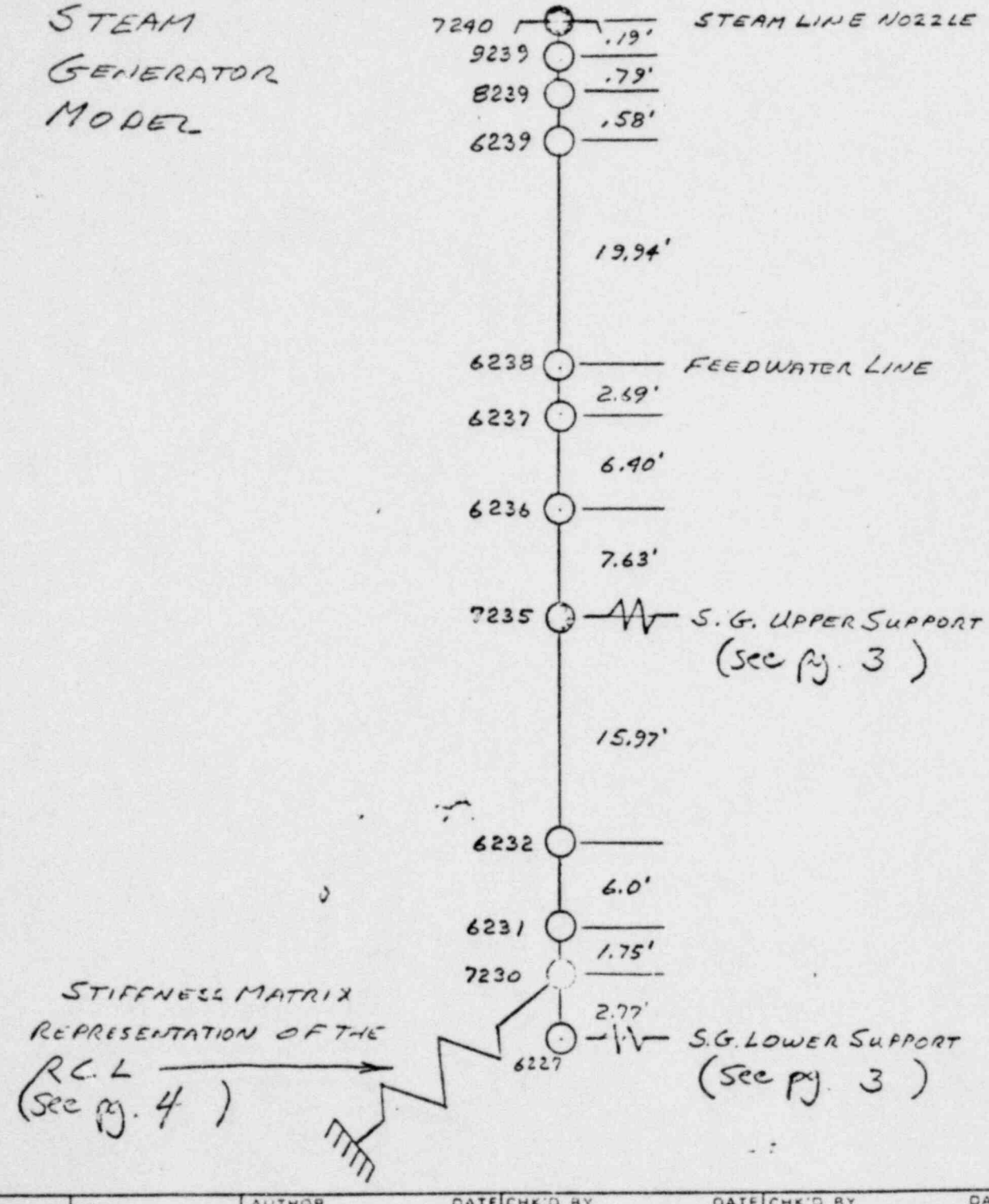
H. O. Thrash, 1L
W. G. Hairston, 1L
J. A. Mooney, 1L
O. Batum, 1L
F. L. Clayton, 1L
J. D. Jones, 1L
O.D.Kingsley ~~R. H. Krotzer~~, 1L

STEAM GENERATOR MODEL FOR FARLEY UNIT #2

TITLE				PAGE
S. G. MODEL				1 OF 4
PROJECT	AUTHOR / DATE	CHK'D BY / DATE	CHK'D BY / DATE	
APR	J. F. SMETANA 2-21-80	[illegible] 2/25/80	—	
S.O.	ORIG. NO.	FILE NO.	GROUP	
EZIP 146	Rimm 2/22/80		AM-RCSA	

STEAM GENERATOR MODEL



REV. NO.	REV. DATE	AUTHOR / DATE	CHK'D BY / DATE	CHK'D BY / DATE

TITLE: S. G. MODEL			PAGE: 2 OF 4
PROJECT: APR	AUTHOR: J.F. SMETANA DATE: 2-21-80	CHK'D BY: [illegible] DATE: 4/25/80	CHK'D. BY: — DATE
S.O.: EZIP 146	CALC NO: KIT... 2/22/80	FILE NO:	GROUP: AM-RCSA

PIPE ELEMENT PROPERTIES (FOR STIFFNESS ONLY)

FROM NODE	TO NODE	O.D. (IN)	t (IN)	E (LB/IN²)
7230	6227	120.0	10.0	25.86 E6
7230	6231	135.94	67.5	"
6231	6232	"	3.25	26.70 E6
6232	7235	"	2.82	"
7235	6236	"	"	26.82 E6
6236	6237	155.0	3.68	"
6237	6239	175.75	3.62	"
6239	8239	46.0	8.5	"
8239	9239	34.5	2.75	"
9239	7240	32.0	1.5	"

LUMPED MASSES

NODE	M_x	M_y	M_z (LBS)	I_{xx}	I_{yy}	I_{zz} (LBS-IN²)
7230	121260.	121260.	121260.	2.80E8	3.38E7	2.80E8
7235	586332.	586332.	586332.	—	—	—
7240	128880.	128880.	128880.	—	—	—

REV. NO.	REV. DATE	AUTHOR DATE	CHK'D. BY DATE	CHK'D. BY DATE

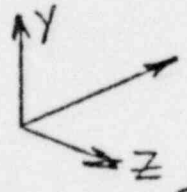
TITLE S. G. MODEL			PAGE 3 OF 4
PROJECT APR	AUTHOR J. F. SMETANA DATE 2-21-80	CHK'D. BY R Langalette DATE 2/25/80	CHK'D. BY — DATE
S.O. EZIP 146	~~APPROVED~~ R Mon 2/20/80	FILE NO.	GROUP AM-RCSA

S. G. UPPER LATERAL SUPPORT LOOP 1

APPLY AT 7235 TO GROUND

	X	Y	Z	X	Y	Z
X	5.2331+ 7	0.0000+ 0	-8.0054+ 7	0.0000+ 0	0.0000+ 0	0.0000+ 0
Y	0.0000+ 0	0.0000+ 0	0.0000+ 0	0.0000+ 0	0.0000+ 0	0.0000+ 0
Z	-8.0054+ 7	0.0000+ 0	1.8667+ 8	0.0000+ 0	0.0000+ 0	0.0000+ 0
X	0.0000+ 0	0.0000+ 0	0.0000+ 0	0.0000+ 0	0.0000+ 0	0.0000+ 0
Y	0.0000+ 0	0.0000+ 0	0.0000+ 0	0.0000+ 0	0.0000+ 0	0.0000+ 0
Z	0.0000+ 0	0.0000+ 0	0.0000+ 0	0.0000+ 0	0.0000+ 0	0.0000+ 0

COORDINATE SYSTEM:



UNITS: lbs, IN, RAD.

S. G. LOWER LATERAL SUPPORT LOOP 1

APPLY AT 6227 TO GROUND
(INCLUDES S. G. COLUMN SUPPORTS)

CASE 1

	X	Y	Z	X	Y	Z
X	2.7779+ 6	1.0142+ 3	-5.9504+ 6	4.3107+ 6	3.1317+ 8	2.0182+ 6
Y	1.0142+ 3	2.3005+ 7	2.6205+ 1	-9.6727+ 4	2.6549+ 4	7.6013+ 4
Z	-5.9504+ 6	2.6205+ 1	1.2775+ 7	-9.3732+ 6	-6.7161+ 8	-4.2279+ 6
X	4.3107+ 6	-9.6727+ 4	-9.3732+ 6	5.4653+10	5.8049+ 7	6.7438+ 8
Y	3.1317+ 8	2.6549+ 4	-6.7161+ 8	5.8049+ 7	5.7054+10	2.1588+ 7
Z	2.0182+ 6	7.6013+ 4	-4.2279+ 6	6.7438+ 8	2.1588+ 7	5.3512+10

CASE 2

	X	Y	Z	X	Y	Z
X	2.0204+ 7	6.6700+ 2	-4.3330+ 7	4.4666+ 6	5.4139+ 8	2.1389+ 6
Y	6.6700+ 2	2.3005+ 7	3.4179+ 2	-9.7247+ 4	-9.5595+ 3	7.5771+ 4
Z	-4.3330+ 7	3.4179+ 2	9.2934+ 7	-9.7506+ 6	-1.1010+ 9	-4.4666+ 6
X	4.4666+ 6	-9.7247+ 4	-9.7506+ 6	5.4630+10	1.2212+ 8	6.6766+ 8
Y	5.4139+ 8	-9.5595+ 3	-1.1010+ 9	1.2212+ 8	1.8390+11	5.5808+ 7
Z	2.1389+ 6	7.5771+ 4	-4.4666+ 6	6.6766+ 8	5.5808+ 7	5.3508+10

REV. NO.	REV. DATE	AUTHOR DATE	CHK'D. BY DATE	CHK'D. BY DATE

TITLE: RCL 1 STIFFNESS AT SG CENTERLINE			PAGE: 4 OF 4
PROJECT: APR	AUTHOR: R Mary DATE: 2/20/90	CHK'D BY: [illegible] DATE: 2/19/90	CHK'D BY: — DATE:
S.O.: EZIP-146	CALC. NO.: 1	FILE NO.: APR-145/15A	GROUP: RCSA

D'Agostino 2/15/90

STIFFNESS OF REACTOR COOLANT LOOP 1 AT STEAM GENERATOR

UNITS: INCHES, lbs, RADIANS

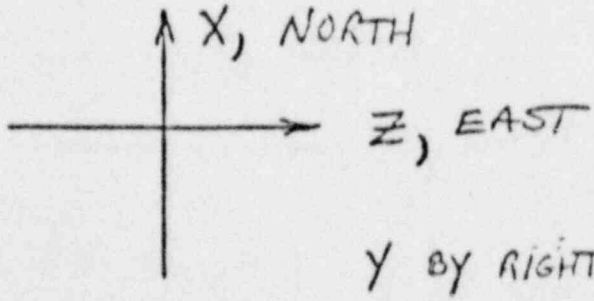
FARLEY UNIT 2 RC PIPING, LOOP 1 STIFFNESS AT SG CENTERLINE

REDUCED STIFFNESS MATRIX 6 X 6

	X	Y	Z	X	Y	Z
X	1.672E+07	7.668E+05	7.255E+06	-5.385E+08	-9.238E+07	1.278E+09
Y	7.668E+05	1.330E+06	4.083E+05	7.594E+07	-1.578E+05	-1.066E+07
Z	7.255E+06	4.083E+05	4.589E+06	-3.833E+08	7.255E+07	5.388E+08
X	-5.385E+08	7.594E+07	-3.833E+08	4.935E+10	-3.986E+09	-4.356E+10
Y	-9.238E+07	-1.578E+05	7.255E+07	-3.986E+09	2.879E+10	-1.071E+10
Z	1.278E+09	-1.066E+07	5.388E+08	-4.338E+10	-1.071E+10	1.215E+11

THE ABOVE MATRIX IS TO BE APPLIED AT NODE 723.0 TO GROUND

CO-ORDINATE SYSTEM:



REV. NO.	REV. DATE	AUTHOR	DATE	CHK'D BY	DATE	CHK'D BY	DATE

REACTOR COOLANT SYSTEM FREQUENCIES AND MODE SHAPES.

Westinghouse Electric Corporation
Water Reactor Divisions
PWR Systems Division
Box 355
Pittsburgh Pennsylvania 15230

S.O. No.: APR-145
MA-PSA-585
Ref: #1 APW-A-4671
#2 W-1354

Mr. A. Vizzi
Project Engineer
Bechtel Power Corporation
P.O. Box 607
Gaithersburg, MD 20760

Dear Mr. Vizzi:

JOSEPH M. FARLEY NUCLEAR PLANT
Replacement Appendix A and B Tables for APW-A-4671

Attached are tables to replace those transmitted in Reference #1. These tables replace the Appendix A and Appendix B tables previously transmitted (Ref. #2).

These tables are replacements only and should be directly inserted into the correct places in Reference #1. All other tables, sketches, descriptions, etc., transmitted in Reference #1 are valid and should be used in conjunction with this replacement data to determine the seismic response of Unit 1 R.C. loop. As in Reference #1, this data reflects latest Unit 1 information and should be considered preliminary for Unit 2.

If there are any questions, please feel free to contact us.

Very truly yours,

H. A. Sinclair, Manager
Southern Company Projects

R. W. Manz/mb

cc: A. Vizzi, 1L, 1A
F. E. Ehrensperger, 1L
F. G. Doar, 1L
F. S. Moore, Jr., 1L
H. O. Thrash, 1L
O. L. Kingsley, 1L
J. A. Mooney, 1L
O. Batum, 1L
F. L. Clayton, 1L
J. D. Jones, 1L

What is this? See me FB

ROUTING	INIT	DATE
PROJ. ENG.		
J. H. BELL		
ARCH		
CIVIL		
CONT SYS		
LICENSING		
PLOOT		
MECH		
PLANT DES		
ELEC-SCH		
PSA		
PROJ. ADM.		
RETURN TO DOC. CONTROL		
JOB NO. 7597-03		

ROUTING		INIT	DATE
PROJ. ENG.			
J. H. BELL			
R. TRICKOVIC			
ARCH			
CIVIL			
CONT SYS			
LICENSING			
ELECT			
MECH			
PLANT DES	2		11/3
PLAN-SCH			
QE			
PROJ. ADM.			
BECHTEL POWER CORP. JOB NO. 7597-03 / 20		FILE	

APW-A-4671

Class I (3)

Westinghouse Electric Corporation
Water Reactor Divisions
PWR Systems Division
Box 355
Pittsburgh Pennsylvania 15230

October 26, 1977
S.O. No.: APR-145
MM-RCSA-877
Ref: (1) APW-A-2641
(2) W-1340

Mr. A. Vizzi
Project Engineer
Bechtel Power Corporation
P.O. Box 607
Gaithersburg, MD 20760

RECEIVED NOV 7 1977 JOB 7597-03/20 BECHTEL

Dear Mr. Vizzi:

JOSEPH M. FARLEY NUCLEAR PLANT
Updated Seismic Structural Response of Unit 1 R.C. Loop

In response to Reference (2), attached is information which supersedes that information previously transmitted in Reference (1).

Attached for your use are frequencies, eigenvectors (or mode shapes) corrected for mass, a table correlating the frequencies and mass points, and mode by mode displacements at the mass locations. The attached data is provided so Bechtel can identify those node points which significantly contribute to the system response. This information is transmitted for 3 support cases for each of the following response spectra shock cases: OBE x+y, OBE y+z, SSE (DBE) x+y, and SSE (DBE) y+z. Table 2 lists the associated support cases for each of the shock cases. The equipment support cases of Table 2 are defined in Appendix B of "Structural Analysis of the Reactor Coolant System for Alabama (Joseph M. Farley) Nuclear Power Plant Unit #1", Report No. SD 113, April 1976. For example,

(SGLS4, SGUS2, RCPS6) or 4-2-6 indicates
Steam Generator Lower Support Case 4
Steam Generator Upper Support Case 2
Reactor Coolant Pump Support Case 6

Figure 1 shows the loop model numbering system and Table 1 describes the location of each of the node and mass points in Figure 1. The coordinate system is shown in Figure 1 and Figure 2.

Frequencies and eigenvectors corrected for mass are a function only of the system parameters such as geometry, stiffness, etc., and are not a function of response spectra. Therefore, only 1 set of frequencies and eigenvectors are provided for each support case. The mode shapes are corrected for mass using the mass normalization method, i.e., $[\phi]^T[M][\phi] = [I]$, where $[\phi]$ = the eigenvectors corrected for mass, $[M]$ = the mass matrix, $[I]$ = the identity matrix. It is this ϕ matrix which is transmitted. The frequencies, eigenvectors

corrected for mass and a table relating the frequencies to the mode numbers are contained in Appendix A. A description of the format and use of this information is also contained in Appendix A.

Appendix B lists mode by mode displacements at the system mass points and other significant node points. The modes listed in Appendix B contribute significantly to the system response. One set of data for each of the cases listed in Table 2 is provided.

This data reflects the latest Unit #1 RCL data and should be considered preliminary for Unit #2.

If there are any questions, please feel free to contact us.

Very truly yours,

T. R. Pureyear for

H. A. Sindt, Manager
Southern Company Projects

T. M. Adams/mb

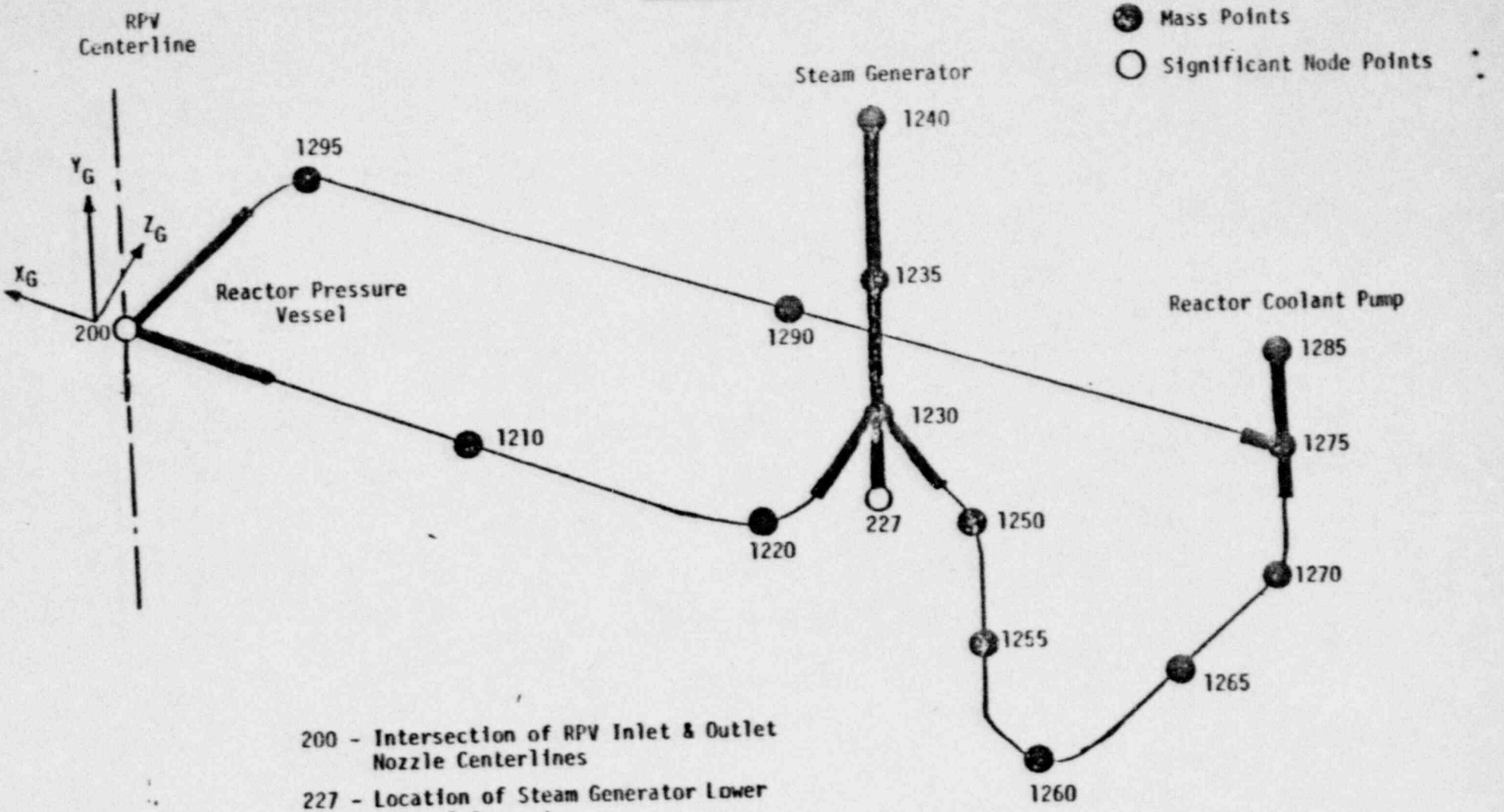
cc: A. Vizzi, 1L, 1A
F. E. Ehrensperger, 1L, 1A
F. G. Doar, 1L, 1A
F. S. Moore, Jr., 1L, 1A
H. O. Thrash, 1L, 1A
O. Kingsley, 1L, 1A
J. A. Mooney, 1L, 1A
O. Batum, 1L, 1A
F. L. Clayton, 1L
J. D. Jones, 1L

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

FIGURE 1



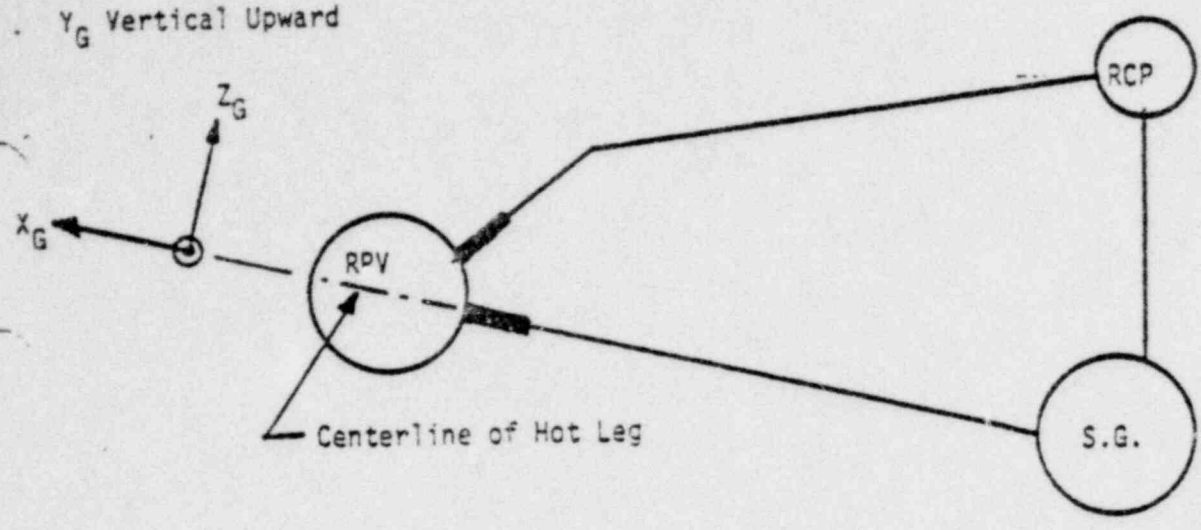
200 - Intersection of RPV Inlet & Outlet Nozzle Centerlines

227 - Location of Steam Generator Lower Lateral Support

AUTHOR J. Adams 10/24/77

CHECKED BY [illegible] 10/24/77

FIGURE 2. Coordinate System



AUTHOR J Adams 10/25/77
CHECKED BY JP Fraser 10/25/77

TABLE 1

MASS POINT LOCATIONS

Mass Point Number	Location
1210	Center of Hot Leg
1220	Center of 50° Steam Generator Inlet Elbow
1230, 1235, 1240	Steam Generator Model
1250	Center of 40° Steam Generator Outlet Elbow
1255	Center of Vertical Portion of Crossover Leg
1260	90° Crossover Leg Elbow Steam Generator Side (Center)
1265	Center of Horizontal Portion of Crossover Leg
1270	90° Elbow Crossover Leg Coolant Pump Side (Center)
1275, 1285	Reactor Coolant Pump Model
1290	Center of Cold Leg
1295	Center of 32° Cold Leg Elbow

AUTHOR [signature] 10/24/77

CHECKED BY [signature] 10/25/77

TABLE 2

ACTIVE SUPPORT CASES [1]

OBE:

Support Cases

x,y Shock	y,z Shock
4-2-6	4-2-6
4-2-5	4-2-5
5-2-5	5-2-5

SSE (DBE):

Support Cases

x,y Shock	y,z Shock
4-2-6	4-2-6
4-2-5	4-2-5
5-2-5	5-2-5

[1] For a description of these support cases see Appendix B, "Structural Analysis of Reactor Coolant Loop/Support System for Alabama (Joseph M. Farley) Nuclear Power Plant Unit #1", Report No. SD 113, April 1976.

AUTHOR J. Adams 10/21/77

CHECKED BY J.P. Fraser 10/25/77

APPENDIX A

FREQUENCIES (Hz), EIGENVECTORS CORRECTED FOR MASS, MODE NUMBER - FREQUENCY CORRELATION TABLES

Each of the sub-appendices in this section contain three tables, A.n.1, A.n.2, and A.n.3, where n denotes the sub-appendix number (n = 1, 2, or 3). A description of each table is listed below:

A.n.1 This table correlates the mass point degrees of freedom at each mass location with a dynamic degree of freedom (DDOF) number and is used in conjunction with Table A.n.3.

For example: At node point 1210 in Table A.1.1, which is the mass located at the center of the hot leg, the x, y, z translational degrees of freedom correspond to the first, second and third degrees of freedom respectively. θ_x, θ_y, θ_z degrees of freedom are not associated with inertia values and are reduced from the equations of motion. All static degrees of freedom are labeled "FREE".

A.n.2 This table lists the system frequencies (Hz) in ascending order. The first four columns of each row list frequencies and the second four columns of each row list the mode numbers corresponding to each of the frequencies contained in that row.

A.n.3 This table lists the ϕ matrix. The intergers in the left most column are degree of freedom numbers given in Table A.n.1 and the data associated with each of these intergers is a row of the ϕ matrix. (See Figure A-1) Each row of the ϕ matrix corresponds to the relative displacement of the mass associated with that degree of freedom for all modes. Example:

$\phi_{3,1}$ thru $\phi_{3,48}$ correspond to the relative displacements of dynamic degree of freedom 3 for all forty-eight modes.

Each column of the ϕ matrix corresponds to the relative displacement of the entire system during one particular vibratory mode. The frequency of this particular vibratory mode may be found as follows:

1) From the frequency table, A.n.2, determine the desired frequency of interest.
2) From columns 5-8 of Table A.n.2, determine the mode number associated with this frequency of interest.
3) The mode number determined in 2) corresponds to the column of the ϕ matrix associated with the frequency of interest, i.e., the column contains the relative mode shape of the system at the frequency of interest.

Example: From Table A.1.2 the frequency of 77.017 Hz corresponds to the 2nd mode, therefore, the second column of the ϕ matrix is the normalized mode shape of the system at 77.017 Hz.

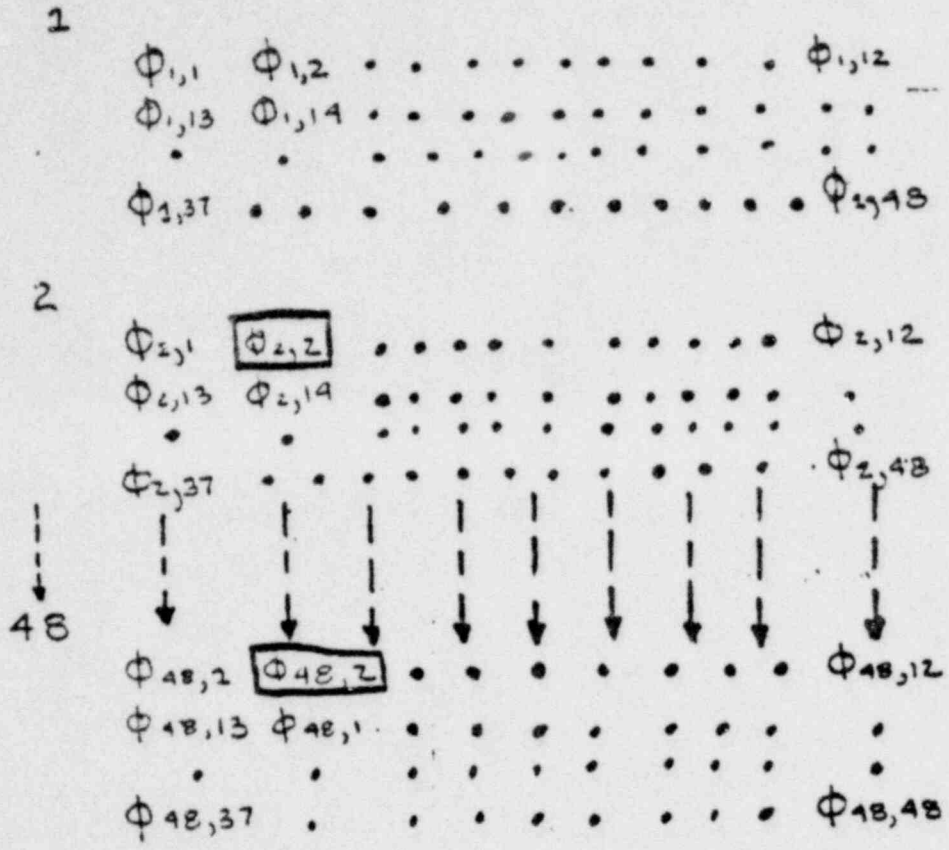
$\phi_{2,2}$ is the displacement of DOOF(2) for the 2nd mode (77.017 Hz) of vibration. From Table A.1.3, $\phi_{2,2}$ = 1.568E-1.

$\phi_{48,2}$ is the displacement of DOOF(48) for the 2nd mode (77.017 Hz) of vibration. From Table A.1.3 $\phi_{48,2}$ = 2.270E-4.

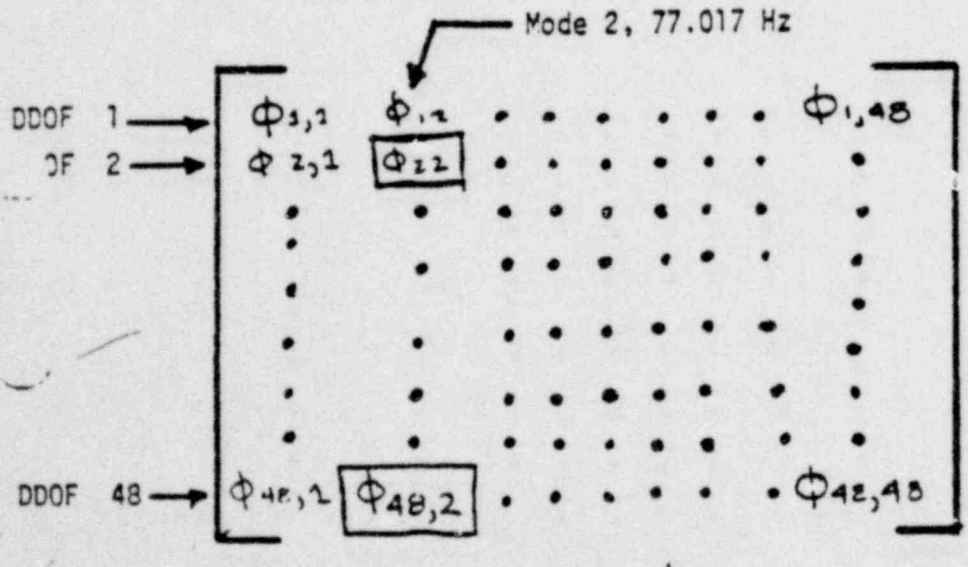
The example values are circled in Table A.1.3 and are circled on Figure A.1.

FIGURE A.1

The Output Data of Tables A.n.3:



The actual ϕ matrix:



NOTE: The subscripts are ϕ(row, column)

APPENDIX A.1

SUPPORT CASE 4-2-6

TITLE				PAGE
Appendix A.1 - Support Case 4-2-6				1 OF 8
PROJECT	AUTHOR / DATE	CHK'D. BY / DATE	CHK'D BY	DATE
APR	J. Richard 2/1/78	K Mary 2/6/78		
S.O.	CALC. NO.	FILE NO.	GROUP	
145			PSA	

TABLE - A.1.1

PIPE SYSTEM GEOMETRY

NUMBER OF NETWORK POINTS = 17
NUMBER OF SECTIONS = 17
ORDER OF DYNAMICAL STIFFNESS MATRIX = 48

NUMBER OF MEMBERS = 83
ORDER OF STIFFNESS MATRIX = 96

NETWORK POINT RESTRAINTS

SEQ	TRANSLATION X	TRANSLATION Y	TRANSLATION Z	ROTATION X	ROTATION Y	ROTATION Z
200	FREE	FREE	FREE	FREE	FREE	FREE
1210	1	2	3	FREE	FREE	FREE
1220	4	5	6	FREE	FREE	FREE
1230	7	8	9	10	11	12
227	FREE	FREE	FREE	FREE	FREE	FREE
1235	13	14	15	FREE	FREE	FREE
1240	16	17	18	FREE	FREE	FREE
1250	19	20	21	FREE	FREE	FREE
1255	22	23	24	FREE	FREE	FREE
1260	25	26	27	FREE	FREE	FREE
1265	28	29	30	FREE	FREE	FREE
1270	31	32	33	FREE	FREE	FREE
1275	34	35	36	37	38	39
1285	40	41	42	FREE	FREE	FREE
1290	43	44	45	FREE	FREE	FREE
1295	46	47	48	FREE	FREE	FREE

TABLE A.1.2

FREQUENCIES IN ORDER, 48

4.9785	7.6882	8.7757	9.7518	42	16	12	40
15.325	17.313	19.161	28.082	14	36	13	9
31.255	35.397	36.929	44.764	35	25	7	45
49.315	52.263	61.980	65.576	44	34	15	28
72.845	77.017	84.090	85.298	31	2	33	17
90.488	104.91	115.21	132.92	43	3	39	24
151.43	157.85	167.28	190.07	12	37	41	22
197.26	209.05	211.48	229.56	26	6	8	10
250.06	276.97	305.88	316.91	1	27	28	32
330.41	366.86	396.73	420.82	11	5	47	21
441.20	452.98	482.06	606.76	48	19	29	20
670.14	839.05	996.99	1112.1	4	30	22	46

REV. NO	REV. DATE	AUTHOR	DATE	CHK'D. BY	DATE	CHK'D. BY	DATE

TABLE A.1.3

DYN MATRIX AFTER DIVISION BY MVC (EIGENVECTOR CORRECTED FOR MASS, 48 X 48)

```
1
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		TITLE Appendix A.1 - Support Case A-2-E			PAGE 2 OF 8
		PROJECT APR	AUTHOR J. Wilkins	DATE 2/6/78	CHK'D BY
		S.O. 195	CALC. NO.	FILE NO.	GROUP PSA
DATE					DATE

TITLE: APPENDIX A.1 - SUPPORT CASE 4-2-6

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PROJECT: APR

AUTHOR: T.M. Lee 2/1/78

CHK'D BY: G. Mang 2/6/78

CHK'D BY: DATE:

S.O.: 145

C.A.C. NO.:

FILE NO.:

GROUP: PSA

REV. NO. | REV DAT

WESTINGHOUSE

DATE

TITLE Appendix A.1 - Support Case 4-2-6

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PROJECT APR

AUTHOR JMcLeland 2/1/78

DATE

CHK'D BY R May 2/6/78

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DATE

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TITLE: Appendix A.2 Support Case 9-2-6

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PROJECT	AUTHOR / DATE	CHK'D. BY / DATE	CHK'D. BY / DATE
APR	J. Willard 2/6/78	R. Mang 2/6/78	
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PROJECT	AUTHOR DATE	CHK'D BY DATE	CHK'D BY	DATE
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S.O.	CALC. NO.	FILE NO.	GROUP	
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TITLE APPENDIX A.1 - SUPPORT CASE 1-2-6

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CHK'D. BY R. Mory DATE 2/6/78

CHK'D. BY

DATE

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FILE NO.

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39
 -1.101E-04-2.541E-05 4.848E-05-1.741E-08 3.483E-06 6.170E-04-2.361E-04 5.413E-04-1.091E-04-1.841E-04-1.236E-04 2.390E-05
 -4.680E-07-3.437E-05-1.723E-05-8.171E-06-9.916E-05 1.923E-05-5.632E-06 9.019E-07-2.366E-05 1.29 E-03 8.950E-08-1.568E-04
 -7.928E-05 5.922E-04 9.781E-05 2.541E-04 3.179E-05 6.505E-06 8.621E-05-1.530E-04 7.277E-04-2.195E-05-1.650E-05 6.966E-05
 -3.657E-04-1.166E-04 1.285E-04-2.391E-04 3.304E-04-4.267E-05-7.687E-04 1.197E-04 1.111E-04 2.548E-10 2.376E-05 5.282E-07

40
 -1.186E-04-3.447E-04 6.958E-04-1.213E-09 1.718E-06 1.040E-03-6.766E-03 7.394E-04-4.976E-03-2.353E-04-7.594E-05 7.796E-05
  1.551E-04 3.048E-03-4.777E-04 1.551E-03-1.184E-03-4.042E-03-1.816E-06 1.685E-07-8.816E-06 2.510E-03 7.269E-10-6.442E-04
 -2.113E-03 1.069E-03 8.569E-05 1.817E-04 9.027E-06 6.023E-07 1.307E-03-1.018E-04 2.982E-03-3.543E-03-6.640E-04-7.356E-03
 -1.041E-03-2.400E-03 7.527E-04 6.220E-02 8.233E-04 1.664E-02-7.792E-03 8.029E-03-2.100E-03-2.000E-09 1.054E-05-9.593E-07

41
  2.027E-04-3.954E-04 2.160E-03 2.202E-07-3.409E-05-3.270E-04-8.937E-04-1.811E-04 4.132E-03 1.244E-03-1.641E-04 9.375E-03
 -1.386E-04-6.033E-04 2.575E-04 5.406E-05 4.054E-04-3.683E-04 4.109E-05-9.737E-06 3.956E-04-3.067E-03-6.862E-09 4.507E-04
  3.524E-03 9.471E-04 3.850E-04 7.637E-04-3.156E-04 2.520E-06-1.478E-03 3.375E-03 1.043E-03-1.077E-03 4.286E-07 4.194E-03
  2.459E-02 2.197E-03 2.035E-03 2.356E-03 4.147E-02-3.368E-04-2.809E-03-1.104E-02-2.649E-03-8.867E-09-3.091E-05-2.796E-07

42
  1.129E-04 1.918E-04-2.902E-04-1.908E-09 2.915E-06 5.675E-04-1.054E-03 3.237E-04 2.537E-03 4.483E-04 4.216E-05-1.699E-03
  4.824E-04 1.018E-02-8.419E-04 6.740E-05-1.994E-04 5.801E-03-3.156E-06 7.679E-07-3.907E-05-6.192E-04 2.086E-09-1.276E-03
  4.288E-03-1.428E-03 4.114E-04-8.234E-05 3.575E-05 2.456E-06 5.036E-03-2.365E-04 8.497E-04 3.519E-04 2.645E-03-2.411E-02
 -2.834E-03-1.162E-02-1.618E-03-1.804E-02 1.858E-03 5.656E-02 1.794E-03-3.101E-03-1.877E-03 7.948E-09-4.738E-04 2.269E-08

43
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  2.514E-04-2.436E-03 7.980E-04-2.336E-04 9.488E-05-5.720E-05 3.623E-06 2.143E-07-2.991E-05 9.494E-03 1.326E-07 2.948E-04
  1.917E-02 1.178E-02 2.757E-04-1.056E-03 4.719E-06 6.967E-07-1.082E-03 5.077E-05 1.828E-02 1.863E-02 7.390E-04 5.652E-03
  4.662E-04-1.101E-03-2.373E-03 2.720E-03 5.478E-04 3.288E-03 1.629E-02-1.167E-02 2.951E-02-6.289E-03-1.626E-06-2.525E-02

44
  3.695E-04 1.369E-03-2.052E-03 1.220E-08-3.989E-06-1.818E-03-3.450E-02-1.709E-03-7.423E-03 9.609E-04 1.831E-04-1.140E-02
 -2.102E-05-2.255E-04 5.578E-04-4.156E-04 2.897E-03 1.406E-03 5.962E-06-5.521E-07 3.123E-05-6.402E-03 9.426E-10 4.874E-04
 -6.014E-03-3.434E-03 1.316E-04-4.077E-04-2.380E-05 7.178E-07 1.053E-03 3.191E-04-7.266E-03 1.421E-02 3.679E-02 2.482E-03
  1.270E-03-5.401E-03-3.105E-03-1.500E-02 1.359E-03 1.045E-04 2.200E-02 1.290E-01 3.600E-02-6.802E-09-4.442E-03-4.372E-07

45
 -4.083E-04 5.322E-04-4.364E-04-2.290E-08 2.660E-07-2.664E-02 6.406E-02 3.725E-02-6.678E-02-1.506E-03-1.895E-04-9.785E-05
  4.113E-04-8. 01E-03 1.161E-03-6.462E-04-5.553E-03-2.547E-04-1.563E-06-3.392E-07 1.989E-05-3.946E-03-4.061E-08 2.189E-05
  6.224E-02-4.249E-03-1.769E-04 4.458E-04-1.198E-05-1.061E-04-5.213E-03 3.466E-05 6.611E-02 1.784E-02 3.072E-03 1.835E-02
  2.455E-05 5.650E-03-6.491E-05 2.325E-03-4.389E-04 1.094E-02 2.593E-03 8.811E-03 2.937E-02 2.313E-03 5.195E-07 4.728E-03

46
  5.164E-04 3.403E-04-5.502E-04-9.893E-07-1.105E-05 3.124E-02-3.202E-03-4.469E-02-5.262E-03 1.821E-03 2.221E-04-1.410E-04
  5.084E-03-4.779E-05 1.838E-04-2.173E-05 2.494E-04 7.779E-06-1.237E-05 6.749E-07 1.089E-04 3.678E-03 1.953E-07 1.066E-04
  1.263E-03 4.738E-03 7.193E-05-5.396E-04 7.322E-05 2.558E-06-5.365E-05 1.181E-04 3.405E-03 4.844E-03 2.812E-05 2.654E-04
  1.907E-04-7.595E-04-8.477E-04 6.739E-04 1.813E-04 9.238E-05 5.414E-03-4.209E-03 7.420E-03 2.693E-01-1.499E-05 2.476E-01
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REV. NO.

REV. DATE

DATE

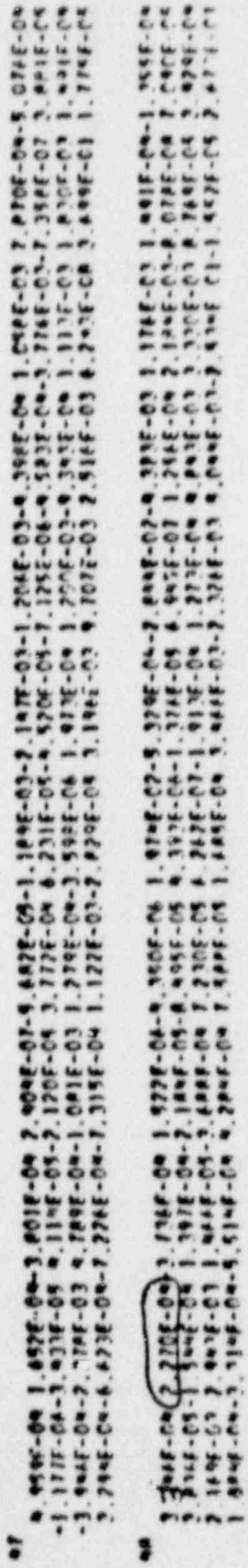
WESTINGHOUSE

TITLE: Appendix A.2 - Support Case 4-2-6

PAGE 8 OF 8

PROJECT	AUTHOR	DATE	CHK'D BY	DATE	CHK'D BY	DATE
APR	J. M. Lubas	2/1/78	R. Mang	2/6/78		

S.O.	CALC. NO.	FILE NO.	GROUP
195			PSA



REV. NO.	REV. DATE	AUTHOR	CHK'D BY	DATE	CHK'D BY	DATE

WESTINGHOUSE FORM 55213C

APPENDIX A.2

SUPPORT CASE 4-2-5

TABLE A.2.1

PIPE SYSTEM GEOMETRY

NUMBER OF NETWORK POINTS = 17
NUMBER OF SECTIONS = 17
ORDER OF DYNAMICAL STIFFNESS MATRIX = 48

NUMBER OF MEMBERS = 82
ORDER OF STIFFNESS MATRIX = 96

NETWORK POINT RESTRAINTS

[redacted]	SEQ	TRANSLATION X	TRANSLATION Y	TRANSLATION Z	ROTATION X	ROTATION Y	ROTATION Z
	200	FREE	FREE	FREE	FREE	FREE	FREE
	1210	1	2	3	FREE	FREE	FREE
	1220	4	5	6	FREE	FREE	FREE
	1230	7	8	9	10	11	12
	227	FREE	FREE	FREE	FREE	FREE	FREE
	1235	13	14	15	FREE	FREE	FREE
	1240	16	17	18	FREE	FREE	FREE
	1250	19	20	21	FREE	FREE	FREE
	1255	22	23	24	FREE	FREE	FREE
	1260	25	26	27	FREE	FREE	FREE
	1265	28	29	30	FREE	FREE	FREE
	1270	31	32	33	34	35	36
	1275	34	35	36	37	38	39
	1285	40	41	42	FREE	FREE	FREE
	1290	43	44	45	FREE	FREE	FREE
	1295	46	47	48	FREE	FREE	FREE

Table A.2.2

FREQUENCIES IN ORDER, 48

5.7916	7.6884	8.7810	9.7900	42	16	18	40
15.963	18.088	19.163	29.590	14	36	13	9
31.321	35.072	36.664	45.033	25	45	25	7
49.350	52.256	61.980	65.765	44	33	15	34
72.879	77.016	89.310	85.671	3	2	17	28
90.380	104.91	115.20	132.92	31	43	6	30
151.93	157.85	167.29	190.09	12	37	41	29
197.27	209.06	211.50	229.56	26	8	22	28
250.06	276.99	305.87	316.91	10	32	1	27
330.91	366.86	396.73	420.82	11	5	47	19
441.20	457.98	482.04	606.71	48	24	24	20
670.14	839.19	996.98	1113.1	4	21	23	46

TABLE A.2.3

THE MATRIX AFTER DIVISION BY UVC (EIGENVECTOR CORRECTED FOR PASS, 48 I 48)

1
7.294E-03 1.007E-02 9.364E-05-2.317E-03-8.691E-02 2.030E-04 1.049E-02-2.251E-02-7.845E-03-1.164E-01 1.105E-03 2.942E-02
2.273E-03-1.129E-04 6.269E-05-7.010E-04 2.932E-03 8.657E-06 1.342E-03-1.771E-03 6.001E-05-1.988E-02-3.854E-05 3.021E-02
2.992E-03 2.207E-02-2.569E-03 9.298E-02 2.215E-04 9.266E-03 1.232E-03 5.193E-03-1.252E-02-8.200E-04 2.515E-04 6.197E-04
-1.614E-02-1.997E-03-7.315E-04-1.225E-04 1.187E-03 6.913E-07-2.241E-03 1.113E-03-2.051E-04-3.962E-06-7.745E-06-9.898E-07

2
-2.005E-04 1.569E-01-2.387E-03 1.979E-03-9.841E-03 6.124E-03-9.821E-03 2.688E-03 1.259E-03 7.272E-03-9.749E-04-1.197E-02
-9.037E-03 6.720E-03-6.375E-04-1.079E-04 3.333E-02 9.782E-03-1.119E-04 6.700E-05-1.208E-06 1.412E-02 1.396E-05-9.070E-03
-1.921E-03-1.645E-03-1.945E-04-9.093E-03 2.296E-05-8.905E-03 8.720E-03-2.993E-04 1.936E-02 1.274E-03-2.667E-04 1.509E-02
9.063E-03-1.816E-02 3.800E-04 6.329E-06 1.356E-04 1.571E-04-1.521E-02-1.338E-03 9.181E-05-7.801E-04-1.298E-06-8.942E-04

3
-9.844E-02 3.498E-03 1.744E-01 1.935E-06-2.128E-04-5.930E-02 1.641E-03-3.634E-03 2.159E-02 2.040E-03-5.010E-03-1.797E-02
-2.881E-04-9.335E-04-2.589E-02-9.921E-04 3.757E-03-9.695E-03 5.355E-04 9.232E-05 1.945E-02-2.362E-03-1.249E-05 6.870E-04
9.973E-02 9.715E-03 7.492E-04 9.684E-03-6.501E-05 5.281E-03-1.917E-02-1.769E-03-9.017E-04-8.965E-02-9.334E-03 2.745E-03
2.804E-03 1.853E-02-8.934E-04 9.493E-04 9.674E-04 3.753E-04-8.934E-03-1.003E-03 2.069E-02 2.353E-03-2.556E-03-1.562E-04

4
-1.749E-03 1.987E-02 2.932E-04 2.127E-01 1.050E-01 5.637E-06 2.239E-02-2.326E-02-5.704E-03-6.965E-02-6.835E-04 9.654E-02
9.271E-03 1.214E-04 1.951E-04-1.509E-03 3.279E-03 1.881E-05-3.159E-03 1.232E-02-1.023E-04-1.507E-02 1.057E-03 2.714E-02
9.259E-03 2.919E-02 1.027E-03 3.974E-02-7.551E-04 8.299E-03 2.090E-03 1.034E-03-2.859E-02-1.778E-03 5.395E-04 1.416E-03
-2.934E-02-1.969E-03 2.604E-03-2.642E-04 1.603E-03 8.549E-06-2.829E-03 2.284E-03-4.927E-04 5.832E-07 1.934E-05-3.047E-06

5
-1.994E-04 2.915E-02-9.825E-04-1.913E-01 1.861E-01-1.264E-02-5.024E-03-2.376E-02 2.130E-04-4.332E-02 9.337E-04 5.717E-02
-6.644E-03 1.695E-02-9.657E-04-5.657E-04-1.294E-02 1.099E-04 3.316E-03-5.225E-03 9.755E-05-1.949E-02-1.135E-03 2.805E-02
-9.729E-04 7.992E-03 9.192E-03 3.962E-02-8.343E-04 3.958E-02-3.584E-03 3.156E-03 1.044E-02-2.294E-04-3.157E-04 9.972E-03
-1.825E-02 6.954E-03-1.351E-02-8.531E-05-1.896E-03 9.198E-04 2.789E-02-7.911E-04-1.396E-05 3.014E-07 1.232E-04 8.817E-07

6
1.295E-01 9.074E-04 2.594E-02-2.707E-04 6.811E-03 1.001E-01 3.311E-02 3.951E-02 3.793E-02-2.654E-02 1.296E-01 7.354E-02
-5.905E-04-1.992E-03-1.907E-02-9.803E-04-1.359E-03-1.004E-02-1.730E-02-1.497E-03-3.935E-04 2.572E-02 9.325E-05-5.827E-02
6.622E-02-9.677E-02-1.551E-02-5.014E-02 1.210E-03-2.812E-02 6.047E-03 2.654E-02 1.159E-03-3.144E-02-1.669E-02 8.733E-03
-1.913E-02-3.238E-04 9.978E-02 7.610E-04 1.104E-03 8.680E-04 1.427E-02-1.302E-03 3.928E-02-5.959E-03-1.923E-04-1.064E-04

7
-2.994E-03 5.975E-03-3.926E-05-7.915E-03 2.396E-03 7.321E-03 2.050E-02-1.826E-03-6.321E-03 6.654E-03-9.925E-04-7.105E-03
1.191E-02 6.952E-04 3.567E-04-9.030E-04 6.875E-04-2.517E-03-1.105E-03-2.295E-03-3.191E-03-1.059E-02 7.325E-04 5.906E-04
6.127E-03-8.964E-04 6.384E-04 1.284E-03 5.012E-04-9.976E-04 6.336E-03-7.630E-04-4.175E-02-2.921E-03 6.296E-04 1.977E-03
-9.914E-03-1.197E-03 5.189E-03-2.987E-04-9.183E-04 3.873E-05 4.775E-04 3.252E-03-9.031E-03-6.001E-04-3.179E-03-1.011E-04

REV. NO. | REV. DATE | DATE

WESTINGHOUSE FORM 62130

TITLE: APPENDIX A.2 - SUPPORT CASE 4-2-5
PROJECT: ALABAMA
S.O.: APS-145
AUTHOR: [illegible] DATE: 4/12/82
CALC NO.
CHK'D BY: R. Mangalvedhe DATE
FILE NO.
GROUP: PSA
CHK'D BY DATE
PAGE 2 OF 7

TITLE: APPENDIX A.2 - SUPPORT CASE 4-2-5

PROJECT	AUTHOR / DATE	CHK'D. BY / DATE	CHK'D. BY / DATE
ALABAMA	JM Lilly 2/1/78	R May 2/6/78	
S.O. APR-145	CALC. NO.	FILE NO.	GROUP PSA

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 2.156E-06  0.200E-03 -1.138E-03  0.031E-03 -9.024E-03 -6.199E-03 -3.356E-03 -1.826E-03 -0.927E-05  7.124E-03  1.604E-04  5.957E-03
-2.527E-06  1.749E-02 -2.672E-04  9.253E-05 -1.242E-02  6.417E-05  2.542E-03 -6.709E-04 -1.905E-05 -1.217E-01 -2.674E-04  4.881E-03
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 0.000E-00  0.000E-00  0.000E-00  0.000E-00  0.000E-00  0.000E-00  0.000E-00  0.000E-00  0.000E-00  0.000E-00  0.000E-00  0.000E-00

-3.955E-03 -7.310E-04 -2.277E-02 -2.123E-04 -3.277E-04 -6.815E-03  3.769E-03  2.625E-03  1.922E-02  8.902E-04 -5.009E-03 -7.209E-03
-3.611E-04 -1.312E-03 -1.222E-03 -9.668E-04  1.101E-03 -6.212E-03  5.837E-03  1.170E-03  1.547E-04  4.155E-03  4.922E-03 -2.221E-03
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-4.955E-03 -7.310E-04 -2.277E-02 -2.123E-04 -3.277E-04 -6.815E-03  3.769E-03  2.625E-03  1.922E-02  8.902E-04 -5.009E-03 -7.209E-03

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-5.415E-05 -1.125E-04 -1.515E-06 -1.929E-05  3.029E-05  7.639E-07 -7.004E-05 -1.245E-05  3.141E-07 -5.241E-04  2.245E-04 -2.127E-04
 2.507E-05  2.536E-04 -8.011E-06 -5.769E-05  1.041E-05  1.199E-04 -5.597E-05 -4.104E-05 -2.720E-05  2.472E-04 -2.503E-04  2.127E-04
-8.055E-04 -9.910E-06  2.013E-04 -2.057E-06  3.887E-05 -2.266E-07 -5.404E-05  4.212E-04 -2.277E-04 -2.503E-04  2.127E-04 -2.127E-04

-3.947E-05  1.904E-04  6.737E-05 -1.457E-06 -6.337E-05 -9.392E-04 -2.424E-03 -7.721E-05  9.182E-04  3.217E-04 -9.092E-04  1.703E-03
-2.329E-02  8.565E-04 -9.464E-03  1.789E-04 -2.276E-04 -1.410E-05  9.043E-04  3.057E-04 -4.625E-03 -2.425E-03  2.274E-03 -2.127E-03
-2.941E-04 -2.673E-04 -9.633E-04 -2.657E-04 -9.864E-04 -2.936E-05  4.034E-03 -2.147E-04 -1.318E-04  1.277E-03 -2.127E-03  2.127E-03
-4.905E-04  1.375E-03  3.240E-05 -1.625E-04  6.377E-05  3.905E-05 -2.183E-04 -3.105E-04  5.652E-03 -1.550E-04  4.971E-04 -2.127E-04

-9.914E-04 -7.041E-04  2.317E-04 -3.192E-05  1.912E-04  1.496E-03  1.049E-04  9.410E-05 -1.511E-04 -1.955E-04 -3.119E-04  4.452E-04
-1.035E-03  2.058E-02  1.365E-04  9.893E-05 -5.481E-03  6.347E-03 -3.021E-05  3.771E-05  5.747E-07 -2.754E-04 -9.001E-04  2.155E-03
-2.977E-04  8.649E-04 -9.372E-05 -2.336E-04 -9.791E-04 -9.043E-03 -1.497E-03  3.325E-05  9.772E-05 -9.402E-04 -4.990E-04  2.155E-03
-2.933E-04  3.034E-03 -2.631E-04 -7.103E-04  3.379E-04 -4.567E-04 -1.155E-02  8.496E-05 -2.070E-04  1.722E-04 -4.990E-04  2.155E-03

-4.844E-04  2.987E-04  9.374E-03  2.355E-07 -9.184E-04  2.378E-04  3.962E-04  1.284E-04  6.841E-04  4.445E-03 -7.817E-04  1.145E-04
-7.276E-04  2.241E-04  2.899E-02  2.810E-05 -5.455E-04  5.682E-04  4.445E-03 -2.240E-04  2.114E-04  1.344E-04  1.845E-04  1.901E-04
 1.921E-03 -9.565E-04  4.251E-05  9.179E-04 -8.249E-04 -2.097E-03  3.191E-04 -7.584E-05  7.180E-04 -4.502E-04 -1.845E-04  2.231E-04
-9.027E-04  3.194E-04 -4.867E-06  7.335E-05  1.899E-04 -2.003E-03  1.342E-03 -6.834E-05  8.891E-04  8.133E-10 -7.870E-04  2.231E-04
```

REV. NO.

DATE

WESTINGHOUSE FORM 552130

```
 16
 -1.409E-04  1.328E-04  4.002E-06 -2.288E-06  8.407E-06  1.520E-04  2.819E-03  1.378E-06 -1.490E-03 -1.472E-05 -2.997E-04 -1.835E-04
 -1.593E-02 -8.831E-04  1.634E-05  5.222E-02 -2.619E-05 -2.794E-03  5.637E-01 -8.902E-07 -9.083E-09  1.093E-06  1.515E-07 -3.635E-05
  9.285E-04 -2.955E-05  1.937E-06  5.376E-06  2.389E-07 -3.225E-05  1.774E-04  1.687E-06 -3.056E-06 -1.513E-04 -1.393E-04 -1.514E-06
  9.834E-05 -2.324E-05 -1.040E-06 -1.595E-03 -1.227E-05  3.349E-05  3.075E-05  2.630E-04 -9.203E-05  1.232E-10 -3.818E-10  1.264E-11
 17
  3.259E-07 -1.041E-02  1.352E-03  9.500E-07 -7.041E-06 -1.396E-03  1.573E-04 -1.618E-05 -1.760E-04  1.424E-05  1.339E-07  2.504E-06
 -1.161E-03  2.132E-02  3.955E-04  5.460E-05  9.054E-02  5.783E-05  1.147E-06 -6.663E-07 -5.169E-09  9.461E-07  5.851E-08 -9.133E-05
 -3.211E-04 -1.769E-03  3.668E-06  3.215E-05  2.502E-07  2.314E-03  5.457E-03  3.045E-06  8.159E-05  1.476E-03 -7.775E-04  4.390E-03
  2.923E-04 -2.046E-02  2.126E-08 -7.295E-05 -1.004E-04  4.591E-04  1.603E-02  1.371E-04 -2.567E-04 -2.459E-10  4.262E-09 -6.905E-09
 18
 -9.290E-07 -4.240E-05 -9.512E-04 -7.923E-04 -1.294E-07 -7.505E-05  2.707E-04 -2.767E-06  3.513E-03 -4.147E-04 -8.727E-04 -8.225E-05
 -1.502E-04 -1.265E-03 -1.617E-03  3.019E-03  6.947E-05  5.375E-02 -3.789E-07  2.566E-06  3.465E-08 -7.258E-06 -5.224E-07  3.131E-05
  9.384E-03  6.281E-05 -3.060E-06 -2.574E-05 -8.793E-07  2.773E-04 -5.963E-05 -2.784E-07  1.882E-04 -1.576E-03  1.895E-03 -3.995E-03
  3.276E-05 -9.092E-05 -1.049E-06  5.877E-03 -1.158E-05 -1.232E-03 -1.734E-04 -4.312E-05  2.332E-03 -1.672E-10  3.843E-09 -3.209E-10
 19
  8.675E-02  2.034E-02 -2.306E-02  1.914E-03 -1.089E-02 -1.177E-01  3.961E-02  2.956E-02 -2.866E-02  2.060E-02  9.073E-02  2.179E-02
  7.311E-03 -1.992E-03  7.259E-03 -3.327E-03  2.855E-03  4.472E-02  5.493E-02  6.033E-04  2.223E-02 -2.225E-02 -5.784E-03  1.785E-03
 -8.206E-03 -1.940E-02 -8.653E-03 -4.176E-03 -1.311E-02 -5.609E-03 -1.807E-02  9.887E-03 -3.354E-02  2.569E-02  4.361E-03  3.945E-03
 -3.692E-02  3.662E-04 -1.916E-01 -1.600E-03  1.288E-02 -1.100E-04 -1.121E-02  3.847E-03 -1.328E-02  1.822E-04 -2.462E-05  3.445E-05
 20
 -1.927E-02  9.072E-03  6.371E-04 -6.969E-04 -3.983E-03 -5.497E-03 -2.063E-03 -1.289E-02  5.337E-03 -3.001E-03 -1.121E-02 -6.565E-03
  9.468E-04  1.607E-02 -7.284E-03  3.311E-04 -2.517E-02 -7.014E-04 -1.137E-01  6.736E-02  5.755E-03 -9.652E-03 -2.341E-01  3.977E-03
  2.785E-03  2.832E-03 -2.115E-02 -1.086E-02  3.681E-02 -9.008E-02  6.238E-03  8.612E-03 -1.365E-03  3.388E-03 -1.662E-03  7.488E-03
  2.691E-03  1.194E-02 -5.328E-04  2.755E-04  7.870E-03  8.702E-04  6.291E-02 -2.034E-04  2.202E-03  2.604E-07  1.700E-04 -6.247E-05
 21
 -4.722E-03  1.271E-03 -2.562E-02  5.536E-03  3.167E-03 -4.479E-02  3.976E-03 -2.617E-02  1.906E-02  1.809E-03  1.124E-02 -8.675E-03
 -8.137E-04 -2.865E-03 -5.687E-03 -4.039E-04 -5.663E-03 -6.325E-03 -1.562E-01 -1.552E-01 -5.381E-03 -1.747E-02  7.533E-02  1.944E-02
  3.513E-02  5.907E-01 -1.982E-02 -1.147E-02  9.162E-02 -7.594E-02  6.281E-04  2.507E-02  4.161E-03  2.269E-02 -9.796E-03  1.137E-02
 -1.011E-02  3.179E-03 -6.777E-02  1.805E-04  6.888E-03  1.040E-03  2.690E-02 -5.783E-04  1.640E-02  6.592E-07  2.116E-04 -6.556E-05
 22
 -1.932E-02  8.209E-03 -1.214E-02 -1.991E-04  8.020E-03 -9.359E-02  5.209E-02  8.100E-02 -5.294E-02 -7.621E-02 -9.801E-02  4.839E-02
  8.753E-03 -1.773E-03  3.067E-03 -2.524E-03  1.077E-02  2.802E-03 -7.434E-03 -1.222E-02  3.380E-03  4.569E-02  1.218E-03 -4.734E-02
  1.174E-02 -2.994E-02 -9.183E-03 -1.173E-01 -1.653E-03 -3.776E-03 -5.140E-02  1.593E-02  5.744E-03  2.184E-02  9.271E-03 -2.222E-03
 -2.974E-02  6.396E-03  6.049E-02 -9.827E-02  1.099E-02 -6.588E-03 -6.592E-03  2.974E-03 -1.473E-02 -4.953E-03  5.218E-04 -1.322E-04
 23
 -1.020E-02  9.693E-03  9.271E-04 -1.066E-02 -2.398E-03 -5.734E-03 -2.540E-03 -9.787E-03  5.985E-03 -4.077E-03 -4.652E-03 -1.314E-02
  8.517E-04  1.471E-02 -7.611E-03  3.447E-04 -2.739E-02 -6.905E-04 -7.775E-02  1.094E-01  4.407E-03 -1.065E-02  1.333E-01  1.926E-02
  2.155E-03  3.134E-02 -3.213E-03 -9.922E-03 -5.035E-02  7.855E-03  3.603E-03 -2.177E-03  3.871E-03 -1.942E-03  9.815E-03 -1.332E-04
 -1.327E-03  1.275E-02  5.491E-03  3.455E-04  9.868E-03  7.181E-02 -2.490E-04  2.139E-03  3.772E-03 -1.932E-04  1.932E-04 -2.604E-04
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REV. NO. | DATE

WESTINGHOUSE FORM 66213C

REV. NO. | REV. DATE

TITLE
APPENDIX A.2 - SUPPORT CASE 4-2-5

PROJECT	AUTHOR	DATE	CHK'D. BY	DATE	CHK'D. BY	DATE
ALABAMA	J.M. Li	2/4/78	R. Marz	2/6/78		
S.O. APP-145	CALC. NO.		FILE NO.		GROUP PSA	

REV. NO.	REV. DATE

DATE

TITLE: APPENDIX A.2 - SUPPORT CASE 4-2-5

PROJECT	AUTHOR	DATE	CHK'D. BY	DATE	CHK'D. BY	DATE
ALABAMA	[illegible]	2/24/78	R Many	2/6/78		
S.O. APP-145	CALC. NO.		TILE NO.		GROUP PSA	

APPENDIX A.3

SUPPORT CASE 5-2-5

TITLE			PAGE
APPENDIX A.3 - SUPPORT CASE 5-2-5			1 OF 7
PROJECT	AUTHOR / DATE	CHK'D. BY / DATE	CHK'D. BY / DATE
ALABAMA	7.M.Cole 2/14/78	R Mang 2/16/78	
S.O.	CALC. NO.	FILE NO.	GROUP
APR-145			PSA

Table A.3.1

PIPE SYSTEM GEOMETRY

NUMBER OF NETWORK POINTS = 17
NUMBER OF SECTIONS = 17
ORDER OF DYNAMICAL STIFFNESS MATRIX = 48

NUMBER OF MEMBERS = 83
ORDER OF STIFFNESS MATRIX = 96

NETWORK POINT RESTRAINTS

SEQ	TRANSLATION X	TRANSLATION Y	TRANSLATION Z	ROTATION X	ROTATION Y	ROTATION Z
200	FREE	FREE	FREE	FREE	FREE	FREE
1210	1	2	3	FREE	FREE	FREE
1220	4	5	6	FREE	FREE	FREE
1230	7	8	9	10	11	12
227	FREE	FREE	FREE	FREE	FREE	FREE
1235	13	14	15	FREE	FREE	FREE
1240	16	17	18	FREE	FREE	FREE
1250	19	20	21	FREE	FREE	FREE
1255	22	23	24	FREE	FREE	FREE
1260	25	26	27	FREE	FREE	FREE
1265	28	29	30	FREE	FREE	FREE
1270	31	32	33	FREE	FREE	FREE
1275	34	35	36	37	38	39
1285	40	41	42	FREE	FREE	FREE
1290	43	44	45	FREE	FREE	FREE
1295	46	47	48	FREE	FREE	FREE

TABLE A.3.2

FREQUENCIES IN ORDER, 48

5.9000	7.6926	9.5643	9.7962	42	16	18	40
15.489	18.554	19.165	30.580	14	36	13	35
31.765	35.428	45.014	49.346	25	45	7	44
52.230	61.676	66.348	68.920	34	15	33	3
77.016	85.309	85.662	89.699	2	17	38	9
90.946	105.08	131.91	138.52	31	8	30	22
158.11	161.81	168.38	190.69	37	19	41	39
197.51	209.30	211.74	239.31	26	43	24	32
250.45	277.59	307.64	316.47	27	1	28	12
339.35	366.93	396.73	421.26	6	5	47	21
441.20	468.07	482.15	606.83	48	11	29	23
670.14	839.18	996.94	1113.1	4	10	20	46

REV. NO.	REV. DATE	AUTHOR	DATE	CHK'D. BY	DATE	CHK'D. BY	DATE

WESTINGHOUSE PWR SYSTEMS DIVISION

TITLE: APPENDIX A.3 - SUPPORT CASE S-2-S — PAGE 2 OF 7

PROJECT: ALABAMA — AUTHOR: [illegible] — DATE: 2/6/78 — CHK'D. BY: — DATE:

S.O.: APR-145 — CALC NO.: [illegible] — FILE NO.: — GROUP: PSA

WESTINGHOUSE FORM 5621-C

TABLE A.3.3

VN MATRIX AFTER DIVISION BY MVC (EIGENVECTOR CORRECTED FOR MASS, 40 X 40)

1
-9.134E-03 1.008E-02 9.720E-04-2.317E-02-8.674E-02 5.037E-03 1.032E-02-2.250E-03 9.158E-04-9.541E-06-9.586E-04-2.689E-03
2.247E-03-9.879E-05 9.463E-05-6.980E-04 2.508E-03 1.461E-05-2.493E-02 3.833E-05-1.397E-03 7.737E-03-1.769E-03 1.934E-02
1.895E-03 2.268E-02-1.107E-01 8.190E-03 2.562E-04 7.530E-03 7.002E-04-5.375E-02-9.908E-04 1.255E-02-2.635E-03 7.604E-04
-2.937E-02-1.434E-03-2.712E-02-1.272E-04-7.594E-03-2.918E-06 2.260E-02 1.296E-03-1.548E-03-4.635E-06-7.425E-04-2.032E-04

2
2.807E-04 1.569E-01-3.090E-03 1.979E-03-4.848E-03-1.176E-05-9.727E-03-1.536E-02 5.929E-03 1.624E-06 3.196E-04-1.867E-04
-9.072E-03 6.894E-03-3.013E-04-1.113E-04 3.322E-02-9.509E-06 7.650E-03-1.396E-05 8.687E-05-3.740E-03 6.752E-05-2.127E-03
-1.129E-03-1.773E-03 6.827E-03-1.997E-04 1.231E-05-1.241E-02 6.365E-03 4.358E-03 1.235E-03-1.939E-02 1.256E-03 1.013E-03
8.693E-03-1.822E-02 3.517E-03 8.286E-06 2.479E-03 1.597E-04-2.691E-03-1.492E-03 [illegible]35E-04 4.556E-06-1.252E-06-9.714E-03

3
2.299E-03 2.173E-04 1.907E-01 1.632E-06-2.669E-04-4.372E-03-1.825E-03-1.038E-02-5.601E-02-2.350E-07-8.780E-04 7.294E-04
-1.887E-05-9.257E-05 6.345E-03-7.910E-05 2.111E-03-5.875E-04 2.062E-02 1.442E-06-5.261E-04 9.133E-03 4.412E-05 2.876E-03
-1.939E-03 4.792E-03 3.128E-03-3.971E-03-3.934E-05 2.294E-02 3.076E-02-7.052E-03 4.264E-02 4.289E-02 2.055E-03 1.271E-04
9.695E-03-4.068E-03-8.425E-03 2.080E-04 6.895E-03 4.416E-05 3.968E-03 3.884E-04 1.249E-03 2.087E-07-2.179E-07-1.694E-06

4
-9.841E-04 1.983E-02 9.983E-04 2.127E-01 1.049E-01-3.804E-03 2.218E-02-2.822E-03 1.576E-03 1.036E-04 3.578E-03 1.071E-03
4.993E-03 4.635E-05 1.159E-04-1.502E-03 3.277E-03 3.063E-05-3.734E-02-1.051E-03 3.224E-03 1.275E-02 1.231E-02 1.940E-02
4.081E-03 2.583E-02-6.094E-02-2.049E-03-8.954E-04 1.394E-02 1.166E-03-3.716E-02-1.088E-03 2.904E-02-5.682E-03 1.719E-03
-3.686E-02-1.935E-03-3.304E-02-2.768E-04-1.107E-02 1.878E-06 2.340E-02 2.669E-03-3.329E-03 5.584E-06 1.269E-05-4.729E-03

5
-2.808E-03 2.913E-02 4.235E-04-1.913E-01 1.863E-01-2.716E-03-4.979E-03 2.835E-02-2.220E-03-1.002E-04-1.174E-02 5.204E-03
-6.734E-03 1.802E-02-2.633E-04-5.720E-04-1.291E-02-2.264E-05-4.365E-02 1.133E-03-2.488E-03 1.113E-02-5.217E-03 1.825E-02
-9.408E-04 8.944E-03-5.891E-02-2.119E-04-4.590E-04 4.510E-02-2.674E-03-4.210E-02-9.152E-05-1.045E-02 1.805E-04 2.486E-03
-3.237E-02 7.037E-03-2.399E-02-8.422E-05-1.657E-02 4.189E-04 2.331E-02-8.211E-04 2.940E-04-3.420E-06 1.018E-05 4.584E-04

6
-3.944E-02 1.982E-04 6.504E-02-3.029E-04 8.550E-03 1.190E-01-2.201E-03 1.727E-02 3.621E-02 3.458E-06 5.248E-02-1.442E-02
-8.784E-05-2.225E-04 4.867E-03-1.385E-04-7.864E-04-1.290E-03-1.029E-01-4.537E-05 1.662E-02-1.965E-02-1.792E-03-3.225E-02
-2.551E-03-4.741E-02-3.963E-02 7.637E-02-5.655E-04-7.412E-02-2.389E-02 7.203E-02 2.477E-02 4.955E-03 3.254E-03 8.125E-04
-4.294E-02 1.942E-03 6.920E-02 3.654E-04-3.954E-02 1.254E-04-4.242E-02 4.785E-04 1.778E-03 2.884E-07-3.097E-04-6.222E-04

7
7.717E-04 5.980E-03 1.928E-03-7.417E-03 2.217E-03-2.047E-03 2.872E-02 4.504E-04 4.164E-02 3.177E-05 4.810E-02 6.662E-04
1.191E-02 8.894E-04 1.003E-04-8.943E-04 2.342E-05 8.907E-06 7.333E-04-7.326E-04 9.511E-04-8.248E-03-2.250E-03 1.342E-02
4.617E-03-7.778E-04 6.479E-03-2.514E-03 3.402E-04-6.436E-03 4.540E-03 5.382E-04-2.382E-03 4.183E-02-6.331E-03 2.493E-02
9.328E-03-1.837E-03-3.011E-04-2.690E-04-1.307E-03 3.263E-05 1.809E-03 3.639E-03-3.837E-03-8.907E-04 2.239E-01-6.379E-02

CHK'D. BY

DATE

TITLE: APPENDIX A.3 - SUPPORT CASE 5-2-5 | PAGE: 3 OF 7

AUTHOR	DATE	CHK'D BY	DATE	CHK'D BY	DATE
J.M. Calo	2/4/78	R. May	2/6/78		

PROJECT: ALABAMA | CALC. NO. | FILE NO. | GROUP: PSA

S.O.: APR-145

-9.6886E-04 0.2585E-03 0.6905E-04 6.8306E-03-9.0346E-03 5.2926E-04-3.6772E-04 3.1737E-02-2.7605E-04 1.0476E-04 1.9216E-04 2.9995E-03
-9.8987E-04 1.1826E-02-2.7326E-04 3.7226E-05-1.7506E-02-4.3822E-05-6.7286E-03-4.3506E-02-3.9552E-03-6.7056E-03 3.8266E-04
-9.8987E-04-1.9406E-02 9.6198E-03 3.3616E-04 9.6622E-04 2.5557E-02-3.0835E-05-4.2606E-03-1.2946E-03 3.9346E-05-1.3047E-04 9.1495E-03
-2.9346E-04-1.9406E-02 9.6198E-03 3.3616E-04 9.6622E-04 2.5557E-02-3.0835E-05-4.2606E-03-1.2946E-03 3.9346E-05-1.3047E-04 9.1495E-03
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-1.1206E-04 3.0916E-03-4.9186E-04-6.9196E-05 5.5376E-04 9.6176E-04-9.3996E-04 8.3776E-04-7.8056E-05-3.1056E-03 7.8966E-04-4.2746E-03

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RE NO

DATE

TITLE: APPENDIX A.3 - SUPPORT CASE 5-2-5 | PAGE 4 OF 7

PROJECT: ALABAMA | AUTHOR: J.M. Calvert 2/1/78 | CHK'D. BY: R. Nam 2/6/78 | CHK'D. BY DATE:

S.O.: APR-145 | CALC. NO.: | FILE NO.: | GROUP: PSA

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REV. NO.

DATE

WESTINGHOUSE PWR SYSTEMS DIVISION

TITLE: APPENDIX A - 3 - SUPPORT CASE 5-2-5 | PAGE 5 OF 7

PROJECT: ALASAMA | AUTHOR: [illegible] DATE: 2/4/82 | CHK'D BY: DATE:

S.O. APR-195 | CALC. NO. | FILE NO. RMAN | GROUP PSA

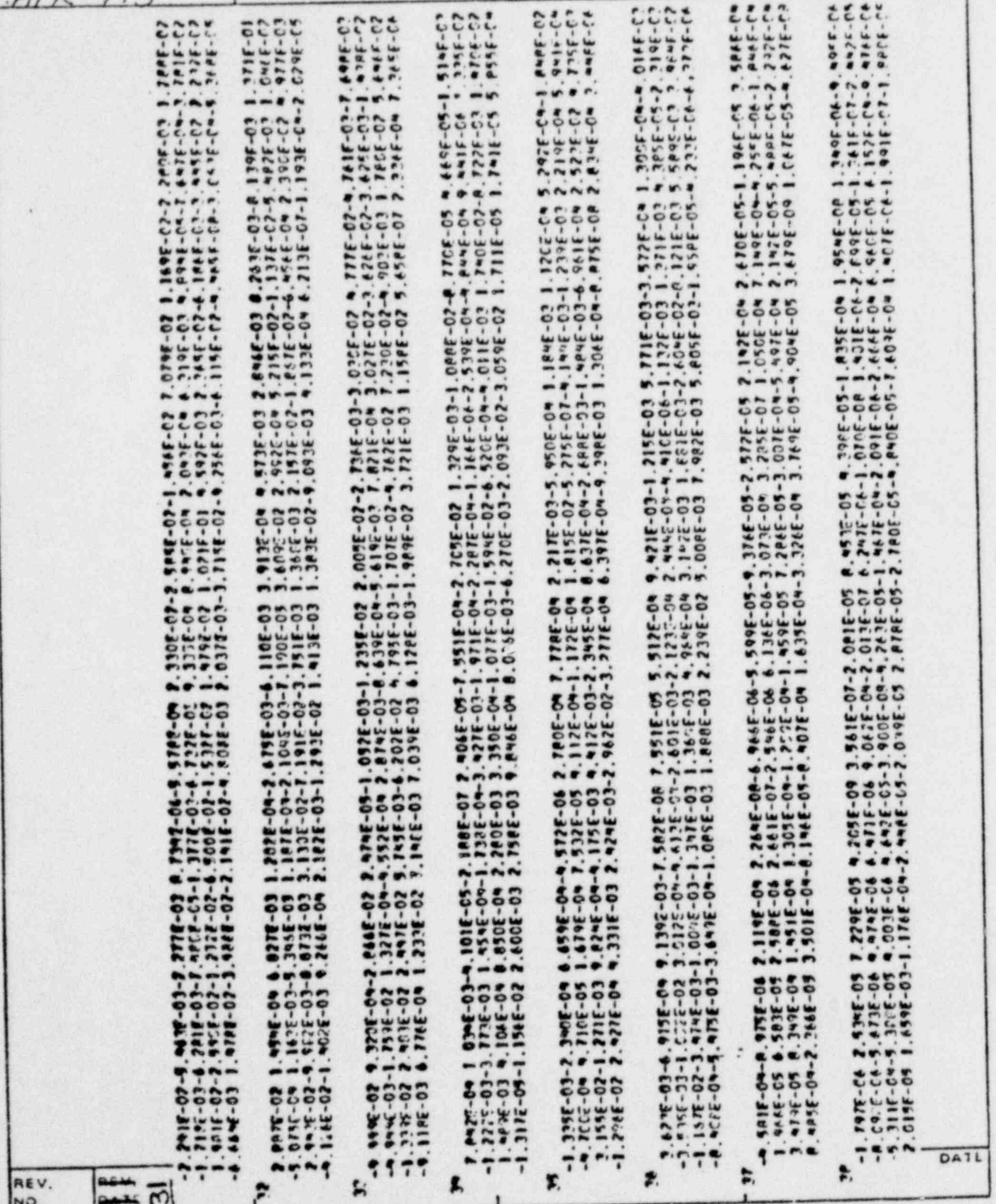
REV. NO | REV. DATE | DATE

WESTINGHOUSE FORM 56213C

TITLE: APPENDIX A.3 - SUPPORT CASE 5-2-5

PAGE 6 OF 7

PROJECT	AUTHOR	DATE	CHK'D BY	DATE	CHK'D BY	DATE
ALABAMA	J.M. Cole	2/1/78	R Mang	2/6/78		
S.O. APR-145	CALC. NO.		FILE NO.		GROUP PSA	



REV. NO.	REV. DATE
31	

WESTINGHOUSE FORM 56213C

TITLE: APPENDIX A.3 - SUPPORT CASE 5-2-5

PAGE 7 OF 7

PROJECT: ALABAMA

AUTHOR: J.M. Calvo 2/14/78 DATE

CHK'D. BY: R. May 2/16/78 DATE

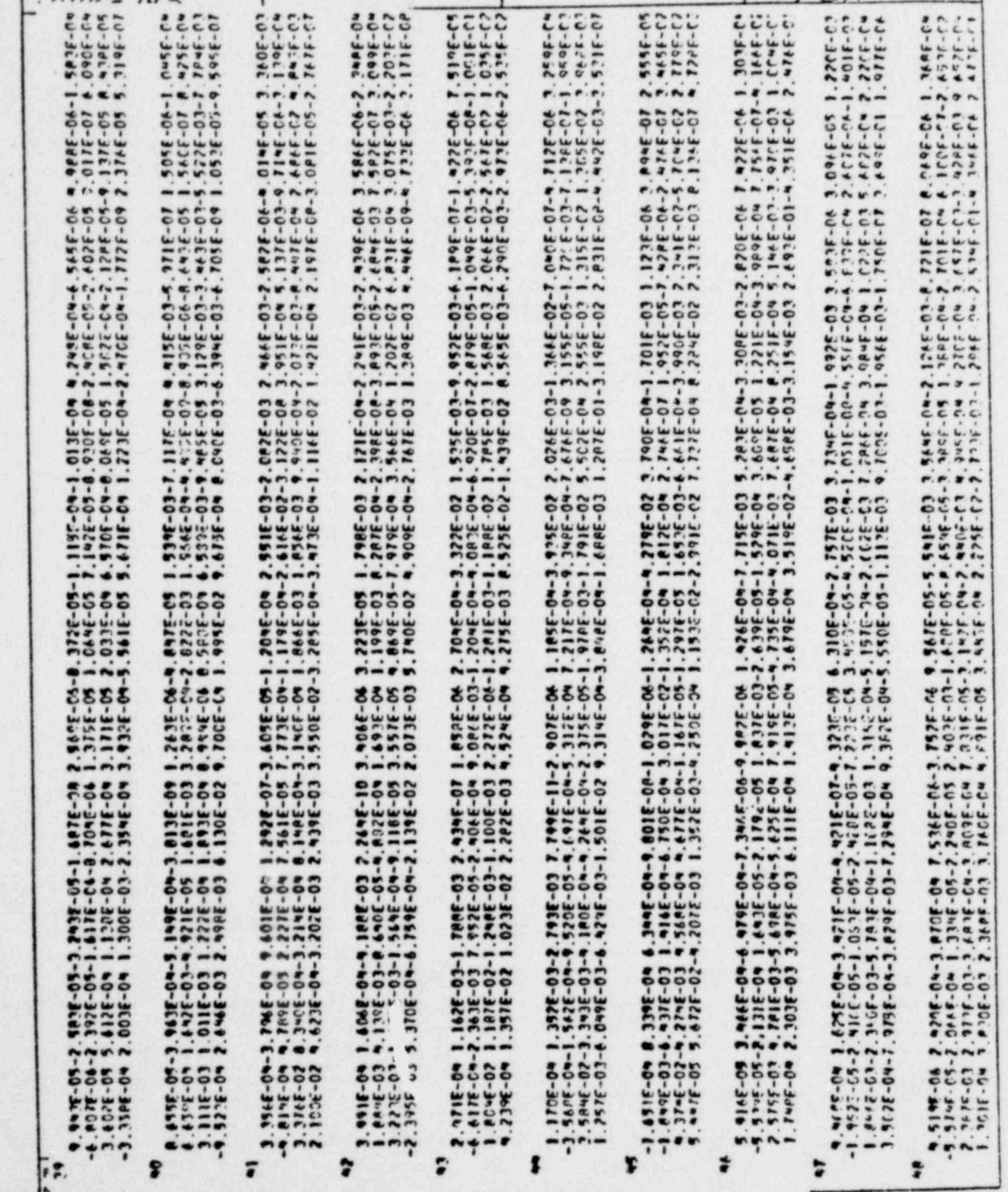
CHK'D. BY DATE

S.O.: ADD - IAC

CALC. NO.

FILE NO.

GROUP: PSA



APPENDIX B

MODE BY MODE DISPLACEMENTS FOR SIGNIFICANT VIBRATORY MODES

As previously stated the frequencies and eigenvectors (corrected for mass) depend only on the support case, for example, the OBE 4-2-6 x,y and the SSE (DBE) 4-2-6 z,y cases have the same frequencies and eigenvectors. Table B.1 should be used to correlate the data of Appendix A to data in this appendix.

The mode numbering system of the tables in this section correspond to the frequencies in ascending order. For example, mode 1 (of this section) corresponds to the lowest frequency (Table A.n.2) and this frequency's associated mode shape (Table A.n.3), mode 2 the second lowest frequency and this frequency's associated mode shape, etc.

The frequencies associated with these modes are listed in the respective tables. All translational displacements are in inches and all rotational displacements are in radians. The displacements are in the coordinate system of Figure 2.

TABLE B.1

Correlation of Appendix A & Appendix B Data

Shock Type & Direction	Appendix B Subappendix	Support Case	Applicable Appendix A Tables
OBE x,y OBE y,z *SSE x,y *SSE y,z	B.1 B.2 B.3 B.4	4-2-6	A.1.1, A.1.2, A.1.3
OBE x,y OBE y,z *SSE x,y *SSE y,z	B.5 B.6 B.7 B.8	4-2-5	A.2.1, A.2.2, A.2.3
OBE x,y OBE y,z *SSE x,y *SSE y,z	B.9 B.10 B.11 B.12	5-2-5	A.3.1, A.3.2 A.3.3

*NOTE: SSE is the same as DBE.

APPENDIX B.1

OBE x,y Support Case 4-2-6

WESTINGHOUSE PWR SYSTEMS DIVISION

TITLE: COMPILATION OF MODE DISPLACEMENTS FOR ALA

PROJECT: ALA | AUTHOR: SDH | DATE: 10/21/77 | CHK'D BY: W. Schuyler | DATE: 10/24/77 | CHK'D BY: [illegible] | DATE: 10-24-77

S.O. 145 | CALC. NO. | FILE NO. 102 | GROUP RCSA | PAGE 2 OF 54

SHOCK DIRECTION X, Y

SHOCK TYPE ØBE

SUPPORT CASE 4,2,6

MODE 1 FREQUENCY 9.98

NODE POINT	D_x	D_y	D_z	θ_x	θ_y	θ_z
200	-.000	.000	.000	.0000	.0000	-.0000
1210	-.000	.000	.001	-.0000	.0000	-.0000
1220	-.000	.000	.002	-.0000	.0000	-.0000
1230	.000	.000	.001	-.0000	-.0000	-.0000
227	.000	.000	.001	-.0000	-.0000	-.0000
1235	.000	.000	-.000	-.0000	-.0000	.0000
1240	-.000	.000	-.003	-.0000	-.0000	.0000
1250	-.000	.001	.002	-.0000	-.0000	-.0000
1255	-.000	.001	.005	-.0001	.0000	-.0000
1260	-.000	.003	.011	-.0001	.0000	-.0000
1265	.001	.004	.012	.0000	.0000	-.0000
1270	.003	.002	.012	.0001	.0001	-.0000
1275	.009	-.000	.030	.0002	.0001	-.0001
1285	.020	-.000	.066	.0002	.0001	-.0001
1290	.004	.000	.013	.0001	.0001	-.0000
1295	.000	-.000	.000	.0000	.0000	-.0000

MODE 2 FREQUENCY 7.69

NODE POINT	D_x	D_y	D_z	θ_x	θ_y	θ_z
200	-.000	-.000	-.000	.0000	-.0000	.0000
1210	-.002	-.000	-.001	.0000	-.0000	.0000
1220	-.004	-.001	-.002	.0000	.0000	.0000
1230	-.002	.000	-.001	.0000	.0000	-.0000
227	-.004	.000	-.001	.0000	.0000	-.0000
1235	.018	.000	.000	.0000	.0000	-.0002
1240	.129	.000	.000	.0000	.0000	-.0003
1250	-.005	.001	-.001	.0000	.0000	-.0000
1255	-.006	.001	-.001	-.0000	.0000	-.0000
1260	-.007	.001	-.001	-.0000	.0000	-.0000
1265	-.008	.001	-.001	-.0000	.0000	-.0000
1270	-.003	.000	-.002	.0000	.0000	-.0000
1275	-.000	.000	-.001	.0000	.0000	-.0000
1285	.004	.000	.000	.0000	.0000	-.0000
1290	-.001	-.001	-.002	.0000	-.0000	.0000
1295	-.000	-.000	-.000	.0000	-.0000	.0000

NOTE: 1) D_x, D_y, D_z are in inches
2) θ_x, θ_y, θ_z are in radians

RUN NO. PCQST7H

WESTINGHOUSE PWR SYSTEMS DIVISION

WESTINGHOUSE FORM 56213C

REV. NO. | REV. DATE | AUTHOR | DATE | CHK'D. BY | DATE | CHK'D. BY | DATE

TITLE COMPILATION OF MODE DISPLACEMENTS FOR ALA

PROJECT ALA | S.O. 145 | AUTHOR SDH | DATE 10/21/77 | CHK'D. BY [illegible] | DATE 10-21-77 | PAGE 3 OF 54

CALC. NO. | FILE NO. 148 | GROUP RCSA

SHOCK DIRECTION X,Y

SHOCK TYPE OBE

SUPPORT CASE 4,2,6

MODE 3 FREQUENCY 8.78

NODE POINT	D_x	D_y	D_z	θ_x	θ_y	θ_z
200	.000	.000	-.000	-.0000	-.0000	-.0000
1210	.000	.000	-.001	.0000	-.0000	-.0000
1220	.000	.000	-.003	.0000	.0000	.0000
1230	-.000	.000	-.002	.0000	.0000	.0000
227	.000	000	-.002	.0000	.0000	.0000
1235	-.000	.000	.000	.0000	.0000	.0000
1240	-.001	.000	.015	.0000	.0000	.0000
1250	.001	-.000	-.002	.0000	.0000	-.0000
1255	.001	-.000	-.002	-.0000	.0000	-.0000
1260	.001	-.000	-.002	-.0000	.0000	.0000
1265	.001	.000	-.002	-.0000	-.0000	.0000
1270	.000	-.000	-.001	.0000	-.0000	.0000
1275	-.000	-.000	-.000	.0000	-.0000	.0000
1285	-.001	-.000	.002	.0000	-.0000	.0000
1290	-.000	.000	-.000	.0000	-.0000	-.0000
1295	.000	.000	.000	-.0000	-.0000	-.0000

MODE 4 FREQUENCY 9.75

NODE POINT	D_x	D_y	D_z	θ_x	θ_y	θ_z
200	.000	-.000	-.000	.0000	.0000	.0000
1210	-.000	.000	.001	-.0000	.0000	-.0000
1220	-.001	.000	.001	-.0000	-.0000	.0000
1230	-.000	.000	.000	-.0000	-.0000	-.0000
227	-.001	.000	.000	-.0000	-.0000	-.0000
1235	-.000	.000	.000	.0000	-.0000	.0000
1240	-.003	.000	.010	.0000	-.0000	.0000
1250	-.003	.001	.000	-.0000	-.0000	-.0001
1255	-.009	.001	.002	-.0001	-.0001	-.0002
1260	-.027	.001	.008	-.0001	-.0001	-.0003
1265	-.041	.003	.011	-.0001	-.0002	-.0004
1270	-.043	.004	.012	-.0001	-.0001	-.0004
1275	.006	.005	-.002	-.0001	-.0001	-.0005
1285	.125	.005	-.036	-.0002	-.0001	-.0007
1290	.005	-.030	.005	.0001	.0000	.0001
1295	.001	-.001	.001	.0000	.0000	.0001

NOTE: 1) D_x, D_y, D_z are in inches

2) θ_x, θ_y, θ_z are in radians

RUN NO. PC6ST7H

WESTINGHOUSE PWR SYSTEMS DIVISION

WESTINGHOUSE FORM 55213C

REV. NO. | REV. DATE | AUTHOR | DATE | CHK'D. BY | DATE | CHK'D. BY | DATE

TITLE COMPILATION OF MODE DISPLACEMENTS FOR ALA

PROJECT ALA | S.O. 145 | CALC. NO. | FILE NO. 143 | GROUP RCSA

AUTHOR S.D.H. 10/21/77 | CHK'D. BY H.S. 10/24/77 | CHK'D. BY [illegible] 10-21-77 | DATE

PAGE 4 OF 54

SHOCK DIRECTION X,Y

SHOCK TYPE OBE

SUPPORT CASE 4,2,6

MODE 5 FREQUENCY 15.32

NODE POINT	D_x	D_y	D_z	θ_x	θ_y	θ_z
200	-.000	.000	-.000	.0000	-.0000	-.0000
1210	-.000	.012	-.003	.0000	-.0000	-.0002
1220	-.000	.030	-.006	.0000	-.0000	-.0001
1230	.001	.031	-.009	.0000	.0000	-.0000
227	001	.031	-.005	.0000	.0000	-.0000
1235	.001	.036	-.000	.0000	.0000	.0000
1240	-.002	.030	-.009	-.0000	.0000	.0000
1250	-.000	.029	-.008	.0002	.0000	-.0000
1255	-.009	.029	-.023	.0009	-.0000	-.0001
1260	-.010	.023	-.050	.0003	-.0000	-.0001
1265	-.013	.009	-.055	.0002	-.0000	-.0001
1270	-.015	.001	-.052	.0001	-.0001	-.0000
1275	-.010	-.001	-.032	.0002	-.0001	-.0001
1285	.004	-.001	.019	.0003	-.0001	-.0001
1290	-.005	-.000	-.019	.0001	-.0001	-.0000
1295	-.000	-.000	-.000	.0000	-.0000	-.0000

MODE 6 FREQUENCY 17.31

NODE POINT	D_x	D_y	D_z	θ_x	θ_y	θ_z
200	.000	.000	.000	-.0000	.0000	-.0000
1210	.000	.002	.003	-.0000	.0000	-.0000
1220	.001	.005	.007	-.0000	.0000	-.0000
1230	.001	.005	.005	-.0000	-.0000	.0000
227	.001	.005	.005	-.0000	-.0000	.0000
1235	.001	.007	.000	-.0000	-.0000	.0000
1240	.000	.007	.003	.0000	-.0000	.0000
1250	.002	.008	.008	-.0001	-.0000	.0000
1255	.004	.008	.020	-.0003	.0000	.0001
1260	.009	.011	.038	-.0001	.0000	.0000
1265	.010	.009	.039	.0001	.0000	-.0000
1270	.012	.003	.040	.0000	.0000	.0000
1275	.008	.003	.027	-.0002	.0001	.0001
1285	-.004	.003	-.018	-.0003	.0001	.0001
1290	.004	.002	.014	-.0001	.0001	.0000
1295	.000	.000	.000	-.0000	.0000	-.0000

NOTE: 1) D_x, D_y, D_z are in inches

2) θ_x, θ_y, θ_z are in radians

RUN NO. PCGST7H

WESTINGHOUSE PWR SYSTEMS DIVISION

TITLE: COMPILATION OF MODE DISPLACEMENTS FOR ALA

PROJECT: ALA | AUTHOR: S.D.H. | DATE: 10/21/77 | CHK'D. BY: [illegible] 10/24/77 | DATE: 10-21-77

S.O. 145 | CALC. NO. | FILE NO. 14B | GROUP RCSA | PAGE 5 OF 54

REV. NO. | REV. DATE | AUTHOR | DATE | CHK'D. BY | DATE | CHK'D. BY | DATE

SHOCK DIRECTION X,Y

SHOCK TYPE SSE

SUPPORT CASE 4,2,6

MODE 1 FREQUENCY 19.16						
NODE POINT	D_x	D_y	D_z	θ_x	θ_y	θ_z
200	.002	-.000	-.000	.0000	.0000	.0000
1210	.001	-.003	-.000	.0000	-.0000	.0000
1220	.003	-.004	-.000	.0000	.0000	-.0000
1230	.007	-.000	-.000	.0000	.0000	-.0000
227	.006	-.000	-.000	.0000	.0000	-.0000
1235	.013	-.001	-.000	.0000	.0000	.0000
1240	-.009	-.001	-.000	-.0000	.0000	.0001
1250	.004	.000	-.000	.0000	-.0000	-.0000
1255	.003	.000	-.000	.0000	-.0000	-.0000
1260	.001	.000	-.001	.0000	-.0000	-.0000
1265	.001	-.000	-.001	-.0000	-.0000	-.0000
1270	.000	-.000	-.001	-.0000	-.0000	-.0000
1275	-.000	-.000	-.000	.0000	-.0000	-.0000
1285	.000	-.000	.000	.0000	-.0000	-.0000
1290	.000	-.000	.000	.0000	.0000	-.0000
1295	.000	-.000	.000	.0000	.0000	-.0000

MODE 8 FREQUENCY 28.08						
NODE POINT	D_x	D_y	D_z	θ_x	θ_y	θ_z
200	-.000	-.000	.000	.0000	-.0000	.0000
1210	-.000	.000	.000	-.0000	.0000	-.0000
1220	-.000	.000	.000	-.0000	-.0000	.0000
1230	-.000	-.000	.000	-.0000	-.0000	-.0000
227	-.000	-.000	.000	-.0000	-.0000	-.0000
1235	.000	-.000	.000	-.0000	-.0000	-.0000
1240	-.000	-.000	.000	.0000	-.0000	.0000
1250	-.000	.000	.000	-.0000	-.0000	-.0000
1255	-.001	.000	.000	-.0000	-.0000	-.0000
1260	-.001	.000	.000	-.0000	.0000	-.0000
1265	-.001	.000	.000	-.0000	.0000	-.0000
1270	-.001	.000	.000	-.0000	.0000	-.0000
1275	-.000	.000	.000	-.0000	.0000	-.0000
1285	-.000	.000	.000	.0000	.0000	-.0000
1290	.001	-.000	-.001	.0000	-.0000	.0000
1295	-.000	-.000	-.000	.0000	-.0000	.0000

NOTE: 1) D_x, D_y, D_z are in inches

2) θ_x, θ_y, θ_z are in radians

RUN NO. PCGST7H

APPENDIX B.2

OBE y,z Support Case 4-2-6

WESTINGHOUSE PWR SYSTEMS DIVISION

WESTINGHOUSE FORM 55213C

SHOCK DIRECTION Z, Y

SHOCK TYPE ΦBE

SUPPORT CASE 4, 2, 6

MODE 1 FREQUENCY 9.98

NODE POINT	D_x	D_y	D_z	θ_x	θ_y	θ_z
200	-.000	.000	.000	.0000	.0000	-.0000
1210	-.000	.000	.003	-.0000	.0000	-.0000
1220	-.000	.001	.007	-.0000	.0000	-.0000
1230	.000	.001	.004	-.0000	-.0000	-.0000
227	.000	.001	.005	-.0000	-.0000	-.0000
1235	.000	.001	-.000	-.0000	-.0000	.0000
1240	-.000	.001	-.009	-.0000	-.0000	.0000
1250	-.001	.004	.004	-.0001	-.0000	-.0000
1255	-.001	.004	.010	-.0003	.0001	-.0000
1260	-.001	.009	.038	-.0002	.0000	-.0000
1265	.002	.015	.040	.0000	.0001	-.0000
1270	.011	.006	.043	.0004	.0002	-.0001
1275	.032	-.001	.105	.0006	.0003	-.0002
1285	.068	-.001	.230	.0007	.0003	-.0002
1290	.013	.000	.045	.0003	.0005	-.0001
1295	.000	-.000	.001	.0000	.0001	-.0000

MODE 2 FREQUENCY 7.69

NODE POINT	D_x	D_y	D_z	θ_x	θ_y	θ_z
200	-.000	-.000	-.000	.0000	-.0000	.0000
1210	-.000	-.000	-.000	.0000	-.0000	.0000
1220	-.000	-.000	-.000	.0000	.0000	.0000
1230	-.000	.000	-.000	.0000	.0000	-.0000
227	-.000	.000	-.000	.0000	.0000	-.0000
1235	.001	.000	.000	.0000	.0000	-.0000
1240	.004	.000	.000	.0000	.0000	-.0000
1250	-.000	.000	-.000	.0000	.0000	-.0000
1255	-.000	.000	-.000	-.0000	.0000	-.0000
1260	-.000	.000	-.000	-.0000	.0000	-.0000
1265	-.000	.000	-.000	-.0000	.0000	-.0000
1270	-.000	.000	-.000	.0000	.0000	-.0000
1275	-.000	.000	-.000	.0000	.0000	-.0000
1285	.000	.000	.000	.0000	.0000	-.0000
1290	-.000	-.000	-.000	.0000	-.0000	.0000
1295	-.000	-.000	-.000	.0000	-.0000	.0000

NOTE: 1) D_x, D_y, D_z are in inches

2) θ_x, θ_y, θ_z are in radians

RUN NO. PCGSTAV

TITLE COMPILATION OF MODE DISPLACEMENTS FOR ALA

PROJECT ALA

AUTHOR S.D.H. DATE 10/21/77

CHK'D. BY [illegible] DATE 10-21-77

S.O. 145

CALC. NO.

FILE NO. 148

GROUP RCSA

PAGE 6 OF 54

REV. NO. / REV. DATE / AUTHOR / DATE / CHK'D. BY / DATE / CHK'D. BY / DATE

WESTINGHOUSE FORM 65213C

WESTINGHOUSE PWR SYSTEMS DIVISION

REV. NO. | REV. DATE | AUTHOR | DATE | CHK'D. BY | DATE | CHK'D. BY | DATE

TITLE: COMPILATION OF MODE DISPLACEMENTS FOR ALA

PROJECT: ALA | S.O. 145 | AUTHOR: S.D.H. 10/21/77 | CALC. NO. | CHK'D. BY: [illegible] 10/24/77 | DATE | FILE NO. 148 | CHK'D. BY: [illegible] 10-31-77 | DATE | GROUP RCSA | PAGE 7 OF 54

SHOCK DIRECTION 2,4

SHOCK TYPE ØBE

SUPPORT CASE 1,2,6

MODE 3 FREQUENCY 8.78

NODE POINT	D_x	D_y	D_z	θ_x	θ_y	θ_z
200	.000	.000	-.000	-.0000	-.0000	-.0000
1210	.000	.000	-.011	.0000	-.0002	-.0000
1220	.000	.000	-.015	.0000	.0000	.0000
1230	-.000	.000	-.015	.0000	.0001	.0000
227	.000	.000	-.016	.0000	.0001	.0000
1235	-.001	.000	.001	.0002	.0001	.0000
1240	-.001	.000	.191	.0003	.0001	.0000
1250	.001	-.002	-.016	.0000	.0001	-.0000
1255	.001	-.002	-.016	-.0000	.0001	-.0000
1260	.001	-.001	-.015	-.0000	.0000	.0000
1265	.000	.000	-.014	-.0000	-.0000	.0000
1270	.002	-.000	-.013	.0000	-.0000	.0000
1275	-.001	-.001	-.009	.0001	-.0000	.0000
1285	-.010	-.001	.014	.0001	-.0000	.0001
1290	-.000	.001	-.001	.0000	-.0000	-.0000
1295	.000	.000	.000	-.0000	-.0001	.0000

MODE 4 FREQUENCY 9.75

NODE POINT	D_x	D_y	D_z	θ_x	θ_y	θ_z
200	.000	-.000	-.000	.0000	.0000	.0000
1210	-.000	.000	.000	-.0000	.0000	-.0000
1220	-.000	.000	.000	-.0000	-.0000	.0000
1230	-.000	.000	.000	-.0000	-.0000	-.0000
227	-.000	.000	.000	-.0000	-.0000	-.0000
1235	-.000	.000	.000	.0000	-.0000	.0000
1240	-.001	.000	.002	.0000	-.0000	.0000
1250	-.001	.000	.000	-.0000	-.0000	-.0000
1255	-.002	.000	.000	-.0000	-.0000	-.0000
1260	-.006	.000	.002	-.0000	-.0000	-.0001
1265	-.009	.001	.003	-.0000	-.0000	-.0001
1270	-.010	.001	.003	-.0000	-.0000	-.0001
1275	.001	.001	-.001	-.0000	-.0000	-.0001
1285	.028	.001	-.008	-.0000	-.0000	-.0002
1290	.001	-.007	.001	.0000	.0000	.0000
1295	.000	-.000	.000	.0000	.0000	.0000

NOTE: 1) D_x, D_y, D_z are in inches

2) θ_x, θ_y, θ_z are in radians

RUN NO. PCGSTAV

WESTINGHOUSE PWR SYSTEMS DIVISION

WESTINGHOUSE FORM 55213C

REV. NO. | REV. DATE

TITLE COMPILATION OF MODE DISPLACEMENTS FOR ALA

PROJECT ALA | AUTHOR S.D.H. | DATE 10/31/77 | CHK'D. BY [illegible] | DATE 10-31-77

S.O. 145 | CALC. NO. | FILE NO. 148 | GROUP RCSA

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SHOCK DIRECTION Z,Y

SHOCK TYPE OBE

SUPPORT CASE 4,2,6

MODE 5 FREQUENCY 15.37

NODE POINT	D_x	D_y	D_z	θ_x	θ_y	θ_z
200	-.000	.000	-.000	.0000	-.0000	-.0000
1210	-.000	.017	-.004	.0000	-.0001	-.0002
1220	-.000	.041	-.009	.0000	-.0000	-.0001
1230	.001	.043	-.004	.0000	.0000	-.0000
227	.001	.043	-.007	.0000	.0000	-.0000
1235	.002	.050	-.000	.0000	.0000	.0000
1240	-.002	.052	-.004	-.0000	.0000	.0000
1250	-.000	.040	-.011	.0002	.0000	-.0001
1255	-.005	.030	-.031	.0005	-.0000	-.0001
1260	-.014	.031	-.049	.0005	-.0000	-.0001
1265	-.018	.013	-.075	.0003	-.0001	-.0001
1270	-.020	.001	-.077	.0002	-.0001	-.0001
1275	-.013	-.002	-.044	.0003	-.0001	-.0001
1285	.004	-.002	.026	.0004	-.0001	-.0001
1290	-.006	-.001	-.021	.0002	-.0002	-.0000
1295	-.000	-.001	-.000	.0000	-.0000	-.0000

MODE 6 FREQUENCY 17.31

NODE POINT	D_x	D_y	D_z	θ_x	θ_y	θ_z
200	.000	.000	.000	-.0000	.0000	-.0000
1210	.000	.002	.003	-.0000	.0000	-.0000
1220	.001	.006	.007	-.0000	.0000	-.0000
1230	.001	.006	.005	-.0000	-.0000	.0000
227	.001	.006	.006	-.0000	-.0000	.0000
1235	.001	.008	.000	-.0000	-.0000	.0000
1240	.000	.008	.004	.0000	-.0003	.0000
1250	.002	.009	.009	-.0001	-.0000	.0000
1255	.005	.019	.023	-.0003	.0000	.0001
1260	.010	.012	.043	-.0001	.0000	.0000
1265	.011	.010	.044	.0001	.0000	-.0000
1270	.013	.009	.046	.0000	.0000	.0000
1275	.009	.003	.031	-.0002	.0001	.0001
1285	-.007	.004	-.020	-.0003	.0001	.0001
1290	.005	.002	.016	-.0001	.0001	.0000
1295	.000	.000	.000	-.0000	.0000	-.0000

NOTE: 1) D_x, D_y, D_z are in inches

2) θ_x, θ_y, θ_z are in radians

RUN NO. PCGSTAV

AUTHOR | DATE | CHK'D. BY | DATE | CHK'D. BY | DATE

WESTINGHOUSE PWR SYSTEMS DIVISION

TITLE: COMPILATION OF MODE DISPLACEMENTS FOR ALA

PROJECT: ALA | S.O. 145 | AUTHOR: S.D.H. | DATE: 10/21/77 | CALC. NO. | FILE NO. 148 | GROUP RCSA | CHK'D. BY | DATE | CHK'D. BY | DATE | PAGE 9 OF 54

SHOCK DIRECTION Z,4

SHOCK TYPE ϕBE

SUPPORT CASE 4,2,6

MODE 8 FREQUENCY 28.08

NODE POINT	D_x	D_y	D_z	θ_x	θ_y	θ_z
200	-.000	-.000	.000	.0000	-.0000	.0000
1210	-.000	.000	.000	-.0000	.0000	-.0000
1220	-.000	.000	.001	-.0000	-.0000	.0000
1230	-.000	-.000	.000	-.0000	-.0000	-.0000
227	-.000	-.000	.000	-.0000	-.0000	-.0000
1235	.000	-.000	.000	-.0000	-.0000	-.0000
1240	-.000	-.000	.000	.0000	-.0000	.0000
1250	-.001	.000	.000	-.0000	-.0000	-.0000
1255	-.001	.000	.000	-.0000	-.0000	-.0000
1260	-.002	.000	.001	-.0000	.0000	-.0000
1265	-.002	.000	.001	-.0000	.0000	-.0000
1270	-.001	.000	.000	-.0000	.0000	-.0000
1275	-.000	.000	.000	-.0000	.0000	-.0000
1285	-.000	.000	.000	.0000	.0000	-.0000
1290	-.001	-.000	-.002	.0000	-.0000	.0000
1295	-.000	-.000	-.000	.0000	-.0000	.0000

MODE 10 FREQUENCY 35.90

NODE POINT	D_x	D_y	D_z	θ_x	θ_y	θ_z
200	-.000	-.000	.000	.0000	.0000	.0000
1210	.000	-.000	.001	-.0000	.0000	.0000
1220	.000	-.000	.001	-.0000	-.0000	-.0000
1230	.000	-.000	.001	-.0000	-.0000	.0000
227	.000	-.000	.001	-.0000	-.0000	.0000
1235	-.000	-.000	.000	-.0000	-.0000	.0000
1240	.000	-.000	.000	.0000	-.0000	-.0000
1250	-.000	.000	.001	.0000	-.0000	.0000
1255	-.000	.000	.000	.0000	-.0000	.0000
1260	-.000	.000	-.000	.0000	-.0000	.0000
1265	-.000	-.000	-.000	-.0000	-.0000	.0000
1270	-.000	.000	-.000	-.0000	-.0000	-.0000
1275	-.000	.000	-.000	-.0000	-.0000	-.0000
1285	-.000	.000	.000	.0000	-.0000	-.0000
1290	.000	-.000	.001	.0000	.0000	.0000
1295	.000	-.000	.000	.0000	.0000	.0000

NOTE: 1) D_x, D_y, D_z are in inches

2) θ_x, θ_y, θ_z are in radians

RUN NO. PCGSTAV

APPENDIX B.3

SSE (DBE) x,y Support Case 4-2-6

WESTINGHOUSE PWR SYSTEMS DIVISION

TITLE: COMPILATION OF MODE DISPLACEMENTS FOR ALA

PROJECT: ALA | S.O. 145 | AUTHOR: S.D.H. | DATE: 10/21/77 | CALC. NO. | CHK'D. BY: [illegible] 10/24/77 | DATE | FILE NO. 140 | GROUP PCSA | CHK'D. BY [illegible] 10/24/77 | DATE | PAGE 10 OF 54

SHOCK DIRECTION X,Y

SHOCK TYPE SSE (DBE)

SUPPORT CASE 4,2,6

MODE 1 FREQUENCY 4.98

NODE POINT	D_x	D_y	D_z	θ_x	θ_y	θ_z
200	-.000	.000	.000	.0000	.0000	-.0000
1210	-.000	.000	.001	-.0000	.0000	-.0000
1220	-.000	.000	.003	-.0000	.0000	-.0000
1230	.000	.000	.002	-.0000	-.0000	-.0000
227	.000	.000	.002	-.0000	-.0000	-.0000
1235	.000	.000	-.000	-.0000	-.0000	.0000
1240	-.000	.000	-.003	-.0000	-.0000	.0000
1250	-.000	.001	.003	-.0000	-.0000	-.0000
1255	-.000	.002	.007	-.0001	.0000	-.0000
1260	-.000	.003	.014	-.0001	.0000	-.0000
1265	.001	.004	.015	.0000	.0000	-.0000
1270	.004	.002	.016	.0001	.0001	-.0000
1275	.012	-.001	.039	.0002	.0001	-.0001
1285	.025	-.001	.087	.0003	.0001	-.0001
1290	.005	.000	.017	.0001	.0002	-.0000
1295	.000	-.000	.000	.0000	.0000	-.0000

MODE 2 FREQUENCY 7.69

NODE POINT	D_x	D_y	D_z	θ_x	θ_y	θ_z
200	-.000	.000	-.000	.0000	-.0000	.0000
1210	-.002	-.000	-.002	.0000	-.0000	.0000
1220	-.005	-.002	-.003	.0000	.0000	.0000
1230	-.003	.000	-.002	.0000	.0000	-.0001
227	-.005	.000	-.002	.0000	.0000	-.0001
1235	.026	.000	.000	.0000	.0000	-.0002
1240	.184	.000	.011	.0000	.0000	-.0004
1250	-.007	.001	-.001	.0000	.0000	-.0001
1255	-.009	.001	-.001	-.0000	.0000	-.0000
1260	-.010	.001	-.001	-.0000	.0001	-.0000
1265	-.008	.001	-.002	-.0000	.0001	-.0000
1270	-.005	.000	-.003	.0000	.0000	-.0000
1275	-.001	.000	-.002	.0000	.0000	-.0000
1285	.005	.000	.000	.0000	.0000	-.0000
1290	-.001	-.001	-.007	.0000	-.0000	.0000
1295	-.000	-.000	-.000	.0000	-.0000	.0000

NOTE: 1) D_x, D_y, D_z are in inches

2) θ_x, θ_y, θ_z are in radians

RUN NO. PC6ST7H

WESTINGHOUSE FORM 5621-3C

DIV NO. | DIV DATE | AUTHOR | DATE | CHK'D BY | DATE

WESTINGHOUSE PWR SYSTEMS DIVISION

TITLE: COMPILATION OF MODE DISPLACEMENTS FOR ALA

PROJECT: ALA | AUTHOR: SDM | DATE: 10/21/77 | CHK'D. BY: [illegible] | DATE: 10-21-77

I.O. 145 | CALC. NO. | FILE NO. 148 | GROUP RCSA | PAGE 11 OF 54

SHOCK DIRECTION X,Y

SHOCK TYPE SSE (DBE)

SUPPORT CASE 4,2,6

MODE 3 FREQUENCY 8.78

NODE POINT	D_x	D_y	D_z	θ_x	θ_y	θ_z
200	.000	.000	-.000	-.0000	-.0000	-.0000
1210	.000	.000	-.001	.0001	-.0000	-.0000
1220	.000	.000	-.003	.0000	.0000	.0000
1230	-.000	.000	-.002	.0000	.0000	.0000
227	.000	.000	-.002	.0000	.0000	.0000
1235	-.000	.000	.000	.0000	.0000	.0000
1240	-.001	.000	.019	.0000	.0000	.0000
1250	.001	-.000	-.002	.0000	.0000	-.0000
1255	.001	-.000	-.002	-.0000	.0000	-.0000
1260	.001	-.000	-.002	-.0000	.0000	.0000
1265	.001	.000	-.001	-.0000	-.0000	.0000
1270	.000	-.000	-.001	.0000	-.0000	.0000
1275	-.000	-.000	-.000	.0000	-.0000	.0000
1285	-.001	-.000	.001	.0000	-.0000	.0000
1290	-.000	.000	-.000	.0000	-.0000	-.0000
1295	.000	.000	.000	-.0000	-.0000	-.0000

MODE 4 FREQUENCY 9.15

NODE POINT	D_x	D_y	D_z	θ_x	θ_y	θ_z
200	.000	-.000	-.000	.0000	.0000	.0000
1210	-.000	.000	.001	-.0000	.0000	-.0000
1220	-.000	.000	.001	-.0000	-.0000	.0000
1230	-.000	.000	.000	-.0000	-.0000	-.0000
227	-.000	.000	.000	-.0000	-.0000	-.0000
1235	-.000	.000	.000	.0000	-.0000	.0000
1240	-.002	.000	.007	.0000	-.0000	.0000
1250	-.002	.000	.000	-.0000	-.0000	-.0000
1255	-.007	.001	.002	-.0000	-.0001	-.0001
1260	-.020	.001	.004	-.0001	-.0001	-.0001
1265	-.031	.002	.009	-.0001	-.0001	-.0002
1270	-.032	.003	.009	-.0001	-.0001	-.0002
1275	.004	.004	-.002	-.0001	-.0001	-.0004
1285	.004	.004	-.027	-.0002	-.0001	-.0004
1290	.004	-.022	.004	.0000	.0000	.0001
1295	.001	-.001	.001	.0000	.0000	.0001

NOTE: 1) D_x, D_y, D_z are in inches

2) θ_x, θ_y, θ_z are in radians

RUN NO. PCGST7H

REV. NO. | REV. DATE | AUTHOR | DATE | CHK'D. BY | DATE

WESTINGHOUSE FORM 66213C

WESTINGHOUSE PWR SYSTEMS DIVISION

WESTINGHOUSE FORM 66213C

REV. NO. | REV. DATE | AUTHOR | DATE | CHK'D BY | DATE

TITLE: COMPILATION OF MODE DISPLACEMENTS FOR ALA

PROJECT: ALA | AUTHOR: S.D.H. | DATE: 10/21/77 | CHK'D BY: [illegible] | DATE: 10-21-77

S.O. 145 | CALC. NO. | FILE NO. 14B | GROUP RCSA

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SHOCK DIRECTION X,Y

SHOCK TYPE SSE (DBE)

SUPPORT CASE 4,2,6

MODE 5 FREQUENCY 15.32

NODE POINT	D_x	D_y	D_z	θ_x	θ_y	θ_z
200	-.000	.000	-.000	.0000	-.0000	-.0000
1210	-.000	.010	-.002	.0000	-.0000	-.0002
1220	-.000	.026	-.005	.0000	-.0000	-.0001
1230	.001	.027	-.009	.0000	.0000	-.0000
227	.001	.027	-.009	.0000	.0000	-.0000
1235	.001	.031	-.000	.0000	.0000	.0000
1240	-.001	.032	-.009	-.0000	.0000	.0000
1250	-.000	.025	-.007	.0001	.0000	-.0000
1255	-.003	.025	-.019	.0003	-.0000	-.0001
1260	-.009	.020	-.043	.0003	-.0000	-.0001
1265	-.011	.008	-.047	.0002	-.0000	-.0000
1270	-.013	.001	-.045	.0001	-.0001	-.0000
1275	-.008	-.001	-.027	.0002	-.0001	-.0001
1285	.005	-.001	.016	.0003	-.0001	-.0001
1290	-.004	-.000	-.013	.0001	-.0001	-.0000
1295	-.000	-.000	-.000	.0000	-.0000	-.0000

MODE 6 FREQUENCY 17.31

NODE POINT	D_x	D_y	D_z	θ_x	θ_y	θ_z
200	.000	.000	000	-.0000	.0000	-.0000
1210	.000	.002	.003	-.0000	.0000	-.0000
1220	.001	.005	.006	-.0000	.0000	-.0000
1230	.001	.005	.009	-.0000	-.0000	.0000
227	.001	.005	.009	-.0000	-.0000	.0000
1235	.001	.006	.000	-.0000	-.0000	.0000
1240	.000	.006	.003	.0000	-.0000	.0000
1250	.001	.007	.007	-.0001	-.0000	.0000
1255	.004	.007	.017	-.0002	.0000	.0001
1260	.008	.009	.033	-.0001	.0000	.0000
1265	.009	.008	.039	.0001	.0000	-.0000
1270	.010	.003	.035	.0000	.0000	.0000
1275	.007	.003	.029	-.0001	.0000	.0000
1285	-.005	.003	-.016	-.0002	.0000	.0001
1290	.004	.002	.017	-.0001	.0001	.0000
1295	.000	.000	.000	-.0000	.0000	-.0000

NOTE: 1) D_x, D_y, D_z are in inches

2) θ_x, θ_y, θ_z are in radians

RUN NO. PCGST711

WESTINGHOUSE FORM 55213C

REV. NO. | REV. DATE | AUTHOR | DATE | CHK'D BY | DATE | CHK'D BY | DATE

SHOCK DIRECTION X,Y

SHOCK TYPE SSE (DBE)

SUPPORT CASE 4,2,6

MODE 7 FREQUENCY 19.16

NODE POINT	D_x	D_y	D_z	θ_x	θ_y	θ_z
208	.000	-.000	-.000	.0000	.0000	.0000
1210	.001	-.003	-.000	.0000	-.0000	.0000
1220	.003	-.009	-.000	.0000	.0000	-.0000
1230	.007	-.000	-.000	.0000	.0000	-.0000
227	.006	-.000	-.000	.0000	.0000	-.0000
1235	.015	-.001	-.000	.0000	.0000	.0000
1240	-.010	-.001	-.000	-.0000	.0000	.0001
1250	.009	.000	-.000	.0000	-.0000	-.0000
1255	.003	.000	-.001	.0000	-.0000	-.0000
1260	.001	.000	-.001	.0000	-.0000	-.0000
1265	.001	-.000	-.001	-.0000	-.0000	-.0000
1270	.000	-.000	-.001	-.0000	-.0000	-.0000
1275	-.000	-.000	-.001	.0000	-.0000	-.0000
1285	.000	-.000	.000	.0000	-.0000	-.0000
1290	.000	-.000	.000	.0000	.0000	-.0000
1295	.000	-.000	.000	.0000	.0000	-.0000

MODE 8 FREQUENCY 28.08

NODE POINT	D_x	D_y	D_z	θ_x	θ_y	θ_z
200	-.000	-.000	.000	.0000	-.0000	.0000
1210	-.000	.000	.001	-.0000	.0000	-.0000
1220	-.000	.000	.002	-.0000	-.0000	.0000
1230	-.000	-.000	.001	-.0000	-.0000	-.0000
227	-.000	-.000	.001	-.0000	-.0000	-.0000
1235	.000	-.000	.000	-.0000	-.0000	-.0000
1240	-.000	-.000	.000	.0000	-.0000	.0000
1250	-.002	.000	.001	-.0000	-.0000	-.0000
1255	-.003	.000	.001	-.0000	-.0000	-.0000
1260	-.004	.000	.002	-.0000	.0000	-.0000
1265	-.005	.000	.001	-.0000	.0000	-.0000
1270	-.003	.000	.001	-.0000	.0000	-.0000
1275	-.001	.000	.000	-.0000	.0000	-.0000
1285	-.000	.000	.000	.0000	.0000	-.0000
1290	-.002	-.000	-.000	.0000	-.0000	.0000
1295	-.000	-.000	-.000	.0000	-.0000	.0000

NOTE: 1) D_x, D_y, D_z are in inches
2) θ_x, θ_y, θ_z are in radians

RUN NO. PCGST711

S.O. 145

PROJECT ALA

TITLE COMPILATION OF MODE DISPLACEMENTS FOR ALA

AUTHOR S.D.H. DATE 10/21/77 CHK'D BY [illegible] DATE 10/24/77

CALC NO. FILE NO. 148

GROUP RCSA DATE CHK'D BY [illegible] DATE 11-21-77

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WESTINGHOUSE PWR SYSTEMS DIVISION

WESTINGHOUSE FORM 56210C

REV. NO. | DATE | AUTHOR | DATE | CHK'D. BY | DATE

SHOCK DIRECTION X,Y

SHOCK TYPE SSE (DBE)

SUPPORT CASE 4,2,6

MODE 11 FREQUENCY 36.93

NODE POINT	D_x	D_y	D_z	θ_x	θ_y	θ_z
200	-.000	-.000	.000	.0000	-.0000	.0000
1210	-.000	.000	-.001	.0000	-.0000	-.0000
1220	-.000	.000	-.001	.0000	.0000	.0000
1230	-.000	.000	-.001	.0000	.0000	-.0000
227	-.000	.000	-.001	.0000	.0000	-.0000
1235	.000	.000	-.000	.0000	.0000	-.0000
1240	-.000	.000	-.000	-.0000	.0000	.0000
1250	.000	-.000	-.000	-.0000	.0000	-.0000
1295	-.000	-.000	-.000	-.0000	.0000	-.0000
1260	-.001	.000	.000	-.0000	-.0000	-.0000
1265	-.001	.000	.000	-.0000	-.0000	-.0000
1270	-.001	.000	.000	-.0000	-.0000	-.0000
1275	-.001	-.000	.000	-.0000	-.0000	-.0000
1285	-.000	-.000	-.000	-.0000	-.0000	-.0000
1290	.000	-.001	.001	.0000	.0000	.0000
1295	-.000	-.000	-.000	.0000	.0000	.0000

NOTE: 1) D_x, D_y, D_z are in inches
2) θ_x, θ_y, θ_z are in radians

RUN NO. PCGST7N

TITLE COMPILATION OF MODE DISPLACEMENTS FOR ALA

PAGE 14 OF 54

PROJECT ALA | AUTHOR SDH 10/21/77 | CHK'D. BY MS 10/24/77 | DATE 10-31-77

S.O. 145 | CALC. NO. ? | FILE NO. 143 | GROUP RCSA

WESTINGHOUSE PWR SYSTEMS DIVISION

APPENDIX B.4

SSE (DBE) y,z Support Case 4-2-6

WESTINGHOUSE PWR SYSTEMS DIVISION

TITLE: COMPILATION OF MODE DISPLACEMENTS FOR ALA

PROJECT: ALA

S.O. 145

AUTHOR: S.D.H. DATE: 10/21/77

CALC. NO.

FILE NO. 14B

GROUP: RCSA

CHK'D. BY: [illegible] DATE: 10-21-77

PAGE 15 OF 54

RCV. NO.

AUTHOR DATE CHK'D. BY DATE

SHOCK DIRECTION Z,Y

SHOCK TYPE SSE (DBE)

SUPPORT CASE 4,2,6

MODE 1 FREQUENCY 9.94

NODE POINT	D_x	D_y	D_z	θ_x	θ_y	θ_z
230	-.000	.000	.000	.0000	.0000	-.0000
1210	-.000	.001	.004	-.0000	.0001	-.0000
1220	-.000	.001	.010	-.0000	.0000	-.0000
1230	.000	.002	.006	-.0000	-.0000	-.0000
227	.000	.002	.007	-.0000	-.0000	-.0000
1235	.000	.002	-.000	-.0000	-.0000	.0000
1240	-.000	.002	-.012	-.0000	-.0000	.0000
1250	-.002	.005	.011	-.0002	-.0000	-.0000
1255	-.002	.006	.025	-.0004	.0000	-.0000
1260	-.001	.017	.053	-.0003	.0000	-.0000
1265	.003	.020	.056	.0000	.0001	-.0000
1270	.015	.028	.040	.0005	.0003	-.0002
1275	.044	-.002	.145	.0008	.0005	-.0002
1285	.044	-.002	.320	.0010	.0004	-.0003
1290	019	.001	.642	.0004	.0006	-.0001
1295	.001	-.000	.951	.0000	.0021	-.0000

MODE 2 FREQUENCY 7.69

NODE POINT	D_x	D_y	D_z	θ_x	θ_y	θ_z
200	-.000	-.000	-.000	.0000	-.0000	.0000
1210	-.000	-.000	-.000	.0000	-.0000	.0000
1220	-.000	-.000	-.000	.0000	.0000	.0000
1230	-.000	.000	-.000	.0000	.0000	-.0000
227	-.000	.000	-.000	.0000	.0000	-.0000
1235	.001	.000	.000	.0000	.0000	-.0000
1240	.005	.000	.000	.0000	.0000	-.0000
1250	-.000	.000	-.000	.0000	.0000	-.0000
1255	-.000	.000	-.000	-.0000	.0000	-.0000
1260	-.000	.000	-.000	-.0000	.0000	-.0000
1265	-.000	.001	-.000	-.0000	.0000	-.0000
1270	-.000	.000	-.000	.0000	.0000	-.0000
1275	-.000	.000	-.000	.0000	.0000	-.0000
1285	.000	.000	.000	.0000	.0000	-.0000
1290	-.000	-.000	-.000	.0000	-.0000	.0000
1295	-.000	-.000	-.000	.0000	-.0000	.0000

NOTE: 1) D_x, D_y, D_z are in inches

2) θ_x, θ_y, θ_z are in radians

RUN NO. PCGSTAV

WESTINGHOUSE PWR SYSTEMS DIVISION

TITLE: COMPILATION OF MODE DISPLACEMENTS FOR ALA

PROJECT: ALA | AUTHOR: S.D.H. | DATE: 10/24/77 | CHK'D. BY: [illegible] | DATE: 10-31-77

S.O. 145 | CALC. NO. | FILE NO. 148 | GROUP RCSA | PAGE 16 OF 54

REV. NO. | REV. DATE | AUTHOR | DATE | CHK'D BY | DATE | CHK'D BY | DATE

SHOCK DIRECTION 2,4

SHOCK TYPE SSE (DBE)

SUPPORT CASE 4,2,6

MODE 3 FREQUENCY 8.78

NODE POINT	D_x	D_y	D_z	θ_x	θ_y	θ_z
200	.000	.000	-.000	-.0000	-.0000	-.0000
1210	.000	.000	-.009	.0000	-.0001	-.0000
1220	.000	.000	-.019	.0000	.0000	.0000
1230	-.000	.000	-.017	.0000	.0001	.0000
227	.000	.000	-.012	.0000	.0001	.0000
1235	-.001	.000	.001	.0001	.0001	.0000
1240	-.005	.000	.102	.0002	.0001	.0000
1250	.006	-.001	-.012	.0000	.0001	-.0000
1255	.005	-.001	-.012	-.0000	.0000	-.0000
1260	.005	-.001	-.011	-.0000	.0000	.0000
1265	.005	.000	-.011	-.0000	-.0000	.0000
1270	.002	-.000	-.010	.0000	-.0000	.0000
1275	-.001	-.001	-.004	.0001	-.0000	.0000
1285	-.008	-.001	.011	.0001	-.0000	.0000
1290	-.000	.001	-.000	.0000	-.0000	-.0000
1295	.000	.000	.000	-.0000	-.0000	-.0000

MODE 4 FREQUENCY 9.75

NODE POINT	D_x	D_y	D_z	θ_x	θ_y	θ_z
200	.000	-.000	-.000	.0000	.0000	.0000
1210	-.000	.000	.000	-.0000	.0000	-.0000
1220	-.000	.000	.000	-.0000	-.0000	.0000
1230	-.000	.000	.000	-.0000	-.0000	-.0000
227	-.000	.000	.000	-.0000	-.0000	-.0000
1235	-.000	.000	.000	.0000	-.0000	.0000
1240	-.001	.000	.002	.0000	-.0000	.0000
1250	-.001	.000	.000	-.0000	-.0000	-.0000
1255	-.002	.000	.000	-.0000	-.0000	-.0000
1260	-.001	.000	.001	-.0000	-.0000	-.0001
1265	-.001	.001	.002	-.0000	-.0000	-.0001
1270	-.000	.001	.002	-.0000	-.0000	-.0001
1275	.001	.001	-.000	-.0000	-.0000	-.0001
1285	.023	.001	-.001	-.0000	-.0000	-.0001
1290	.001	-.005	.001	.0000	.0000	.0000
1295	.000	-.000	.000	.0000	.0000	.0000

NOTE: 1) D_x, D_y, D_z are in inches

2) θ_x, θ_y, θ_z are in radians

RUN NO. PCGSTAV

WESTINGHOUSE PWR SYSTEMS DIVISION

WESTINGHOUSE FORM 55213C

TITLE: COMPILATION OF MODE DISPLACEMENTS FOR ALA

PROJECT: ALA

S.O. 145

AUTHOR: S.O.H. 10/21/77

CALC. NO. 148

CHK'D. BY: K.S. 10/24/77

FILE NO.

GROUP: RCSA

CHK'D. BY: [illegible] 10-24-77

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REV. NO. | REV. DATE | AUTHOR | DATE | CHK'D. BY | DATE | CHK'D. BY | DATE

SHOCK DIRECTION 2,4

SHOCK TYPE SSE (DBE)

SUPPORT CASE 4,2,6

MODE 5 FREQUENCY 15.32

NODE POINT	D_x	D_y	D_z	θ_x	θ_y	θ_z
200	-.000	.000	-.000	.0000	-.0000	-.0000
1210	-.000	.019	-.003	.0000	-.0000	-.0002
1220	-.000	.035	-.007	.0000	-.0000	-.0001
1230	.001	.037	-.006	.0000	.0000	-.0000
227	.001	.036	-.006	.0000	.0000	-.0000
1235	.002	.043	-.000	.0000	.0000	.0000
1240	-.002	.044	-.005	-.0000	.0000	.0000
1250	-.000	.034	-.010	.0002	.0000	-.0000
1255	-.004	.033	-.027	.0004	-.0000	-.0001
1260	-.012	.027	-.052	.0004	-.0000	-.0001
1265	-.019	.011	-.069	.0002	-.0000	-.0001
1270	-.017	.001	-.041	.0002	-.0001	-.0001
1275	-.011	-.001	-.037	.0002	-.0001	-.0001
1285	.007	-.001	.022	.0004	-.0001	-.0001
1290	-.005	-.000	-.018	.0001	-.0002	-.0000
1295	-.000	-.000	-.000	.0000	-.0000	-.0000

MODE 6 FREQUENCY 17.31

NODE POINT	D_x	D_y	D_z	θ_x	θ_y	θ_z
200	.000	.000	.000	-.0000	.0000	-.0000
1210	.000	.003	.004	-.0000	.0001	-.0000
1220	.001	.007	.003	-.0000	.0000	-.0000
1230	.002	.008	.006	-.0000	-.0000	.0000
227	.002	.008	.007	-.0000	-.0000	.0000
1235	.001	.009	.000	-.0000	-.0000	.0000
1240	.000	.010	.005	.0000	-.0000	.0000
1250	.002	.011	.011	-.0002	-.0000	.0000
1255	.006	.011	.028	-.0004	.0000	.0001
1260	.012	.015	.053	-.0002	.0000	.0000
1265	.019	.013	.055	.0001	.0000	-.0000
1270	.017	.005	.056	.0000	.0001	.0000
1275	.012	.004	.038	-.0002	.0001	.0001
1285	-.008	.004	-.025	-.0004	.0001	.0001
1290	.004	.003	.020	-.0001	.0002	.0000
1295	.000	.000	.000	-.0000	.0000	-.0000

NOTE: 1) D_x, D_y, D_z are in inches

2) θ_x, θ_y, θ_z are in radians

RUN NO. PCGSTAV

WESTINGHOUSE FORM 55213C

WESTINGHOUSE PWR SYSTEMS DIVISION

REV. NO. | REV. DATE | AUTHOR | DATE | CHK'D. BY | DATE

TITLE COMPILATION OF MODE DISPLACEMENTS FOR ALA

PROJECT ALA | S.O. 145 | AUTHOR S.D.H. 10/24/77 | CALC. NO. | DATE | CHK'D. BY H.S. 10/24/77 | FILE NO. 148 | DATE | CHK'D. BY 10-31-77 | DATE | GROUP RCSI | PAGE 18 OF 54

SHOCK DIRECTION Z,Y

SHOCK TYPE SSE (DBE)

SUPPORT CASE 4,2,6

MODE 7 FREQUENCY 19.16

NODE POINT	D_x	D_y	D_z	θ_x	θ_y	θ_z
200	.000	-.000	-.000	.0000	.0000	.0000
1210	.000	-.000	-.000	.0000	-.0000	.0000
1220	.000	-.000	-.000	.0000	.0000	-.0000
1230	.001	-.000	-.000	.0000	.0000	-.0000
227	.000	-.000	-.000	.0000	.0000	-.0000
1235	.001	-.000	-.000	.0000	.0000	.0000
1240	-.001	-.000	-.000	-.0000	.0000	.0000
1250	.000	.000	-.000	.0000	-.0000	-.0000
1255	.000	.000	-.000	.0000	-.0000	-.0000
1260	.000	.000	-.000	.0000	-.0000	-.0000
1265	.000	-.000	-.000	-.0000	-.0000	-.0000
1270	.000	-.000	-.000	-.0000	-.0000	-.0000
1275	-.000	-.000	-.000	.0000	-.0000	-.0000
1285	.000	-.000	.000	.0000	-.0000	-.0000
1290	.000	-.000	.000	.0000	.0000	-.0000
1295	.000	-.000	.000	.0000	.0000	-.0000

MODE 8 FREQUENCY 28.08

NODE POINT	D_x	D_y	D_z	θ_x	θ_y	θ_z
200	-.000	-.000	.000	.0000	-.0000	.0000
1210	-.000	.000	.001	-.0000	.0000	-.0000
1220	-.000	.000	.001	-.0000	-.0000	.0000
1230	-.000	-.000	.000	-.0000	-.0000	-.0000
227	-.000	-.000	.000	-.0000	-.0000	-.0000
1235	.000	-.000	.000	-.0000	-.0000	-.0000
1240	-.000	-.000	.000	.0000	-.0000	.0000
1250	-.001	.000	.000	-.0000	-.0000	-.0000
1255	-.002	.000	.001	-.0000	-.0000	-.0000
1260	-.001	.000	.001	-.0000	.0000	-.0000
1265	-.003	.000	.001	-.0000	.0000	-.0000
1270	-.001	.000	.000	-.0000	.0000	-.0000
1275	.000	.000	.000	-.0000	.0000	-.0000
1285	-.000	.000	.000	0000	.0000	-.0000
1290	-.001	-.000	-.002	.0000	-.0000	.0000
1295	-.000	-.000	-.000	.0000	-.0000	.0000

NOTE: 1) D_x, D_y, D_z are in inches

2) θ_x, θ_y, θ_z are in radians

RUN NO. PCGSTAV

WESTINGHOUSE FORM 56213C

WESTINGHOUSE PWR SYSTEMS DIVISION

TITLE: COMPILATION OF MODE DISPLACEMENTS FOR ALA

PROJECT: ALA | AUTHOR: SDH | DATE: 10/24/77 | CHK'D BY: H.S. 10/24/77 | DATE: 10-24-77 | PAGE: 19 OF 54

S.O. 145 | CALC NO. | FILE NO. 14B | GROUP RCSA

REV. NO. | REV. DATE | AUTHOR | DATE | CHK'D BY | DATE | CHK'D BY | DATE

SHOCK DIRECTION 2,4

SHOCK TYPE SSE (DBE)

SUPPORT CASE 4,2,6

MODE 10 FREQUENCY 35.40

NODE POINT	D_x	D_y	D_z	θ_x	θ_y	θ_z
200	-.000	-.000	.000	.0000	.0000	.0000
1210	.000	-.000	.001	-.0000	.0000	.0000
1220	.000	-.000	.002	-.0000	-.0000	-.0000
1230	.000	-.000	.001	-.0000	-.0000	.0000
227	.000	-.000	.001	-.0000	-.0000	.0000
1235	-.000	-.000	.000	-.0000	-.0000	.0000
1240	.000	-.000	.000	.0000	-.0000	-.0000
1250	-.001	.000	.001	.0000	-.0000	.0000
1255	-.000	.000	.001	.0000	-.0000	.0000
1260	-.001	.000	-.000	.0000	-.0000	.0000
1265	-.000	-.000	-.000	-.0000	-.0000	.0000
1270	-.000	.000	-.000	-.0000	-.0000	-.0000
1275	-.000	.000	-.000	-.0000	-.0000	-.0000
1285	-.000	.000	.000	.0000	-.0000	-.0000
1290	.00	-.000	.002	.0000	.0000	.0000
1295	.000	-.000	.000	.0000	.0000	.0000

NOTE: 1) D_x, D_y, D_z are in inches
2) θ_x, θ_y, θ_z are in radians

RUN NO. PCGSTAV

APPENDIX B.5

OBE x,y Support Case 4-2-5

WESTINGHOUSE PWR SYSTEMS DIVISION

WESTINGHOUSE FORM 55213C

REV. NO.	REV. DATE	AUTHOR	DATE	CHK'D. BY	DATE	CHK'D. BY	DATE

TITLE COMPILATION OF MODE DISPLACEMENTS FOR ALA

PROJECT ALA | S.O. 145 | AUTHOR SDH 10/21/77 | CALC. NO. | CHK'D. BY [illegible] 10/24/77 | FILE NO. 14B | CHK'D. BY [illegible] 10-21-77 | GROUP 1 RCSA | DATE | PAGE 20 OF 54

SHOCK DIRECTION X,Y

SHOCK TYPE ØBE

SUPPORT CASE 1,2,5

MODE 1 FREQUENCY 5.79

NODE POINT	D_x	D_y	D_z	θ_x	θ_y	θ_z
200	.000	.000	.000	.0000	.0000	-.0000
1210	.000	.000	.000	-.0000	.0000	-.0000
1220	.000	.000	.001	-.0000	.0000	-.0000
1230	.000	.000	.000	-.0000	-.0000	-.0000
227	.000	.000	.001	-.0000	-.0000	-.0000
1235	.000	.000	-.000	-.0000	-.0000	.0000
1240	.000	.000	-.001	-.0000	-.0000	.0000
1250	-.000	.001	.001	-.0000	-.0000	.0000
1255	-.000	.001	.002	-.0000	.0000	.0000
1260	.000	.002	.005	-.0000	.0000	-.0000
1265	.001	.002	.006	-.0000	.0000	-.0000
1270	.002	.001	.006	.0001	.0000	-.0000
1275	.008	-.000	.022	.0002	.0000	-.0001
1285	.019	-.000	.055	.0002	.0000	-.0001
1290	.004	-.000	.011	.0001	.0001	-.0000
1295	.000	-.000	.000	.0000	.0000	-.0000

MODE 2 FREQUENCY 7.69

NODE POINT	D_x	D_y	D_z	θ_x	θ_y	θ_z
200	-.000	-.000	-.000	.0000	-.0000	.0000
1210	-.002	-.000	-.001	.0000	-.0000	.0000
1220	-.004	-.001	-.002	.0000	.0000	.0000
1230	-.002	.000	-.001	.0000	.0000	-.0000
227	-.004	.000	-.001	.0000	.0000	-.0000
1235	.018	.000	.000	.0000	.0000	-.0002
1240	.129	.000	.007	.0000	.0000	-.0003
1250	-.005	.001	-.001	.0000	.0000	-.0000
1255	-.008	.001	-.001	-.0[illegible]	.0000	-.0000
1260	-.007	.001	-.001	-.0000	.0000	-.0000
1265	-.005	.001	-.001	-.0000	.0000	-.0000
1270	-.003	.000	-.002	.0000	.0000	-.0000
1275	-.000	.000	-.001	.0000	.0000	-.0000
1285	.004	.000	-.000	.0000	.0000	-.0000
1293	-.001	-.001	-.002	.0000	-.0000	.0000
1295	-.000	-.000	-.000	.0000	-.0000	.0000

NOTE: 1) D_x, D_y, D_z are in inches

2) θ_x, θ_y, θ_z are in radians

RUN NO. PCGST7H

WESTINGHOUSE FORM 92130

REV. NO. | REV. DATE

AUTHOR | DATE | CHK'D. BY | DATE | CHK'D. BY | DATE

TITLE: COMPILATION OF MODE DISPLACEMENTS FOR ALA

PROJECT: ALA

W.O. 145

AUTHOR: S.D.H. 10/21/77

CALC. NO.

CHK'D. BY: W. S. 10/24/77

DATE

FILE NO. 148

GROUP RCSA

CHK'D. BY: [illegible] 10-31-77

DATE

PAGE 21 OF 54

SHOCK DIRECTION X,Y

SHOCK TYPE OBE

SUPPORT CASE 4,2,5

MODE 3 FREQUENCY 8.78						
NODE POINT	D_x	D_y	D_z	θ_x	θ_y	θ_z
200	-.000	.000	-.000	-.0000	-.0000	-.0000
1210	.000	.000	-.001	.0000	-.0000	-.0000
1220	.000	.000	-.003	.0000	.0000	.0000
1230	-.000	.000	-.002	.0000	.0000	.0000
227	.000	.000	-.002	.0000	.0000	.0000
1235	-.000	.000	.000	.0000	.0000	.0000
1240	-.001	.000	.017	.0000	.0000	.0000
1250	.001	-.000	-.002	.0000	.0000	-.0000
1255	.001	-.000	-.002	-.0000	.0000	-.0000
1260	.001	-.000	-.002	-.0000	.0000	.0000
1265	.001	-.000	-.002	-.0000	-.0000	.0000
1270	.001	-.000	-.002	.0000	-.0000	.0000
1275	-.000	-.000	-.001	.0000	-.0000	.0000
1285	-.002	-.000	.002	.0000	-.0000	.0000
1290	-.000	.001	-.000	.0000	-.0000	-.0000
1295	-.000	.000	-.000	-.0000	-.0000	-.0000

MODE 4 FREQUENCY 9.79						
NODE POINT	D_x	D_y	D_z	θ_x	θ_y	θ_z
200	.000	-.000	-.000	.0000	.0000	.0000
1210	-.000	.000	.001	-.0000	.0000	.0000
1220	-.001	-.000	.001	-.0000	-.0000	.0000
1230	-.001	-.000	.000	-.0000	-.0000	-.0000
227	-.001	-.000	.000	-.0000	-.0000	-.0000
1235	-.000	-.000	.000	.0000	-.0000	.0000
1240	-.003	-.000	.011	.0000	-.0000	.0000
1250	-.003	.001	.000	-.0000	-.0000	-.0001
1255	-.009	.001	.003	-.0001	-.0001	-.0002
1260	-.027	.001	.010	-.0001	-.0001	-.0003
1265	-.040	.003	.014	-.0001	-.0002	-.0003
1270	-.042	.004	.014	-.0001	-.0001	-.0004
1275	.005	.005	-.002	-.0002	-.0000	-.0005
1285	.118	.005	-.041	-.0002	-.0000	-.0007
1290	.004	-.029	.002	.0000	.0000	.0001
1295	.001	-.001	.001	.0000	.0000	.0001

NOTE: 1) D_x, D_y, D_z are in inches
2) θ_x, θ_y, θ_z are in radians

RUN NO. DCGST7H

WESTINGHOUSE PWR SYSTEMS DIVISION

WESTINGHOUSE PWR SYSTEMS DIVISION

TITLE: COMPILATION OF MODE DISPLACEMENTS FOR ALA

PROJECT: ALA | S.O. 145 | CALC. NO. 1 | FILE NO. 14B | GROUP RCSA

AUTHOR: SDH 10/21/77 | CHK'D BY: HLS 10/21/77 | CHK'D BY: [illegible] 10-21-77 | DATE

PAGE 22 OF 54

REV. NO. | REV. DATE | AUTHOR | DATE | CHK'D BY | DATE | CHK'D BY | DATE

SHOCK DIRECTION X,Y

SHOCK TYPE SSE

SUPPORT CASE 4,2,5

MODE 5 FREQUENCY 15.96

NODE POINT	D_x	D_y	D_z	θ_x	θ_y	θ_z
200	-.000	.000	-.000	.0000	-.0000	-.0000
1210	-.000	.013	-.002	.0000	-.0000	-.0002
1220	.000	.032	-.004	.0000	-.0000	-.0001
1230	.001	.034	-.003	.0000	.0000	-.0000
227	.001	.033	-.003	.0000	.000[illegible]	-.0000
1235	.002	.039	-.000	.0000	.0000	.0000
1240	-.002	.041	-.002	-.0000	.0000	.0000
1250	-.000	.032	-.005	.0001	-.0000	-.0000
1255	-.003	.032	-.016	.0002	-.0000	-.0001
1260	-.010	.027	-.036	.0003	-.0000	-.0001
1265	-.013	.013	-.048	.0002	-.0000	-.0001
1270	-.013	.002	-.038	.0001	-.0000	-.0001
1275	-.008	-.000	-.023	.0001	-.0000	-.0001
1285	.004	-.000	.009	.0002	-.0000	-.0001
1290	-.005	-.001	-.019	.0001	-.0001	-.0001
1295	-.000	-.000	-.000	.0000	-.0000	-.0001

MODE 6 FREQUENCY 18.09

NODE POINT	D_x	D_y	D_z	θ_x	θ_y	θ_z
200	.000	.000	.000	-.0000	.0000	-.0000
1210	.000	.001	.002	-.0000	.0000	-.0000
1220	.001	.002	.004	-.0000	.0000	-.0000
1230	.001	.002	.003	-.0000	-.0000	.0000
227	.001	.002	.003	-.0000	-.0000	.0000
1235	.001	.003	.003	-.0000	-.0000	.0000
1240	-.000	.003	.002	.0000	-.0000	.0000
1250	.002	.004	.005	-.0001	.0000	.0000
1255	.004	.004	.013	-.0002	.0000	.0001
1260	.006	.006	.025	-.0001	.0000	.0000
1265	.009	.005	.025	.0000	.0000	.0000
1270	.010	.002	.026	.0000	.0000	.0000
1275	.007	.002	.018	-.0001	.0000	.0000
1285	-.004	.002	-.010	-.0002	.0000	.0001
1290	.004	.002	.012	-.0001	.0001	.0000
1295	.000	.000	.000	-.0000	.0000	-.0001

NOTE: 1) D_x, D_y, D_z are in inches

2) θ_x, θ_y, θ_z are in radians

RUN NO. PCGST7H

WESTINGHOUSE FORM 92213C

WESTINGHOUSE PWR SYSTEMS DIVISION

SHOCK DIRECTION X,Y

SHOCK TYPE OBE

SUPPORT CASE 4,2,5

MODE 7 FREQUENCY 19.16

NODE POINT	D_x	D_y	D_z	θ_x	θ_y	θ_z
200	.000	-.000	-.000	.0000	-.0000	.0000
1210	.001	-.003	-.000	.0000	-.0000	.0000
1220	.003	-.004	-.000	.0000	-.0000	-.0000
1230	.[illegible]7	-.000	-.000	.0000	.0000	-.0000
227	.006	-.000	-.000	.0000	.0000	-.0000
1235	.013	-.001	-.000	.0000	.0000	.0000
1240	-.009	-.001	-.000	-.0000	.0000	.0001
1250	.004	.000	-.000	.0000	-.0000	-.0000
1255	.003	.000	-.001	.0000	-.0000	-.0000
1260	.001	-.000	-.002	.0000	-.0000	-.0000
1265	.000	-.000	-.002	-.0000	-.0000	-.0000
1270	-.000	-.000	-.001	-.0000	-.0000	-.0000
1275	-.000	-.000	-.001	.0000	-.0000	-.0000
1205	.000	-.000	.001	.0000	-.0000	-.0000
1290	-.000	-.000	-.000	.0000	-.0000	-.0000
1295	-.000	-.000	-.000	.0000	-.0000	.0000

MODE 8 FREQUENCY 29.59

NODE POINT	D_x	D_y	D_z	θ_x	θ_y	θ_z
200	-.000	-.000	.000	.0000	-.0000	-.0000
1210	-.000	.000	.000	-.0000	.0000	-.0000
1220	-.000	.000	.001	-.0000	-.0000	.0000
1230	-.000	-.000	.000	-.0000	-.0000	-.0000
227	-.000	-.000	.000	-.0000	-.0000	-.0000
1235	.000	-.000	.000	-.0000	-.0000	-.0000
1240	-.000	-.000	.000	.0000	-.0000	.0000
1250	-.000	.000	.000	-.0000	-.0000	-.0000
1255	-.001	.000	.000	-.0000	-.0000	-.0000
1260	-.001	.000	.000	-.0000	.0000	-.0000
1265	-.001	.000	.000	-.0000	.0000	-.0000
1270	-.001	.000	.000	-.0000	.0000	-.0000
1275	-.000	.000	.000	-.0000	.0000	-.0000
1285	-.0	.000	.000	.0000	.0000	.0000
1290	-.000	-.000	-.001	-.0000	-.0000	-.0000
1295	-.000	-.000	-.000	.0000	-.0000	.0000

NOTE: 1) D_x, D_y, D_z are in inches
2) θ_x, θ_y, θ_z are in radians

RUN NO. RCGST7H

S.O. 145

CALC. NO. 148

GROUP RCSA

PROJECT ALA

AUTHOR SDH 10/21/77

CHK'D. BY [illegible] 10/21/77

CHK'D. BY [illegible] 10-31-77

TITLE COMPILATION OF MODE DISPLACEMENTS FOR ALA

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REV. NO. | REV. DATE | AUTHOR | DATE | CHK'D BY | DATE | CHK'D BY | DATE

APPENDIX B.6

OBE y,z Support Case 4-2-5

WESTINGHOUSE FORM 55213C

REV. NO. | REV. DATE | AUTHOR | DATE | CHK'D. BY | DATE | CHK'D. BY | DATE

SHOCK DIRECTION Z, Y
SHOCK TYPE ΦBE
SUPPORT CASE 4, 2, 5

MODE 1 FREQUENCY 5.19						
NODE POINT	D_x	D_y	D_z	θ_x	θ_y	θ_z
200	.000	.000	.000	.0000	.0000	-.0000
1210	.000	.000	.001	-.0000	.0000	-.0000
1220	.000	.001	.002	-.0000	.0000	-.0000
1230	.000	.001	.001	-.0000	-.0000	-.0000
227	.000	.001	.002	-.0000	-.0000	-.0000
1235	.000	.001	-.000	-.0000	-.0000	.0000
1240	.000	.001	-.004	-.0000	-.0000	.0000
1250	-.000	.002	.003	-.0000	-.0000	.0000
1255	-.000	.003	.007	-.0001	.0000	.0000
1260	.000	.005	.015	-.0001	.0000	-.0000
1265	.002	.009	.017	-.0000	.0000	-.0000
1270	.004	.009	.019	.0002	.0001	-.0000
1275	.021	-.001	.044	.0005	.0001	-.0002
1285	.037	-.001	.144	.0004	.0001	-.0002
1290	.012	-.001	.031	.0002	.0003	-.0001
1295	.001	-.000	.001	.0000	.0001	-.0000

MODE 2 FREQUENCY 7.89						
NODE POINT	D_x	D_y	D_z	θ_x	θ_y	θ_z
200	-.000	-.000	-.000	.0000	-.0000	.0000
1210	-.000	-.000	-.000	.0000	-.0000	.0000
1220	-.000	-.000	-.000	.0000	.0000	.0000
1230	-.000	.000	-.000	.0000	.0000	-.0000
227	-.000	.000	-.000	.0000	.0000	-.0000
1235	.001	.000	.000	.0000	.0000	-.0000
1240	.004	.000	.000	.0000	.0000	-.0000
1250	-.000	.000	-.000	.0000	.0000	-.0000
1255	-.000	.000	-.000	-.0000	.0000	-.0000
1260	-.000	.000	-.000	-.0000	.0000	-.0000
1265	-.000	.000	-.000	-.0000	.0000	-.0000
1270	-.000	.000	-.000	.0000	.0000	-.0000
1275	-.000	.000	-.000	.0000	.0000	-.0000
1285	.000	.000	-.000	.0000	.0000	-.0000
1290	-.000	-.000	-.000	.0000	-.0000	.0000
1295	-.000	-.000	-.000	.0000	-.0000	.0000

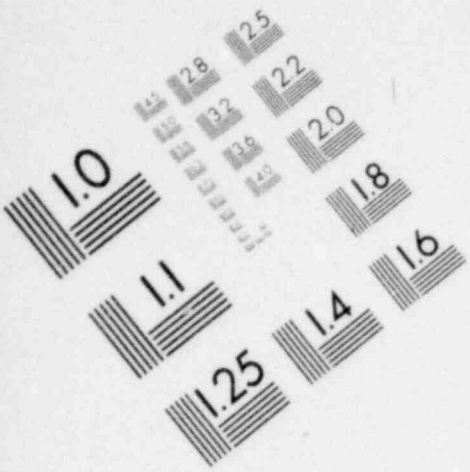
NOTE: 1) D_x, D_y, D_z are in inches
2) θ_x, θ_y, θ_z are in radians

RUN NO. PCGSTAV

S.O. 145
CALC. NO.
FILE NO. 145
GROUP RCSA

TITLE COMPILATION OF MODE DISPLACEMENTS FOR ALA
PROJECT ALA
AUTHOR S.D.H. DATE 10/24/77
CHK'D. BY R.S. DATE 10/24/77
CHK'D. BY DATE 10-31-77
PAGE 24 OF 54

WESTINGHOUSE PWR SYSTEMS DIVISION



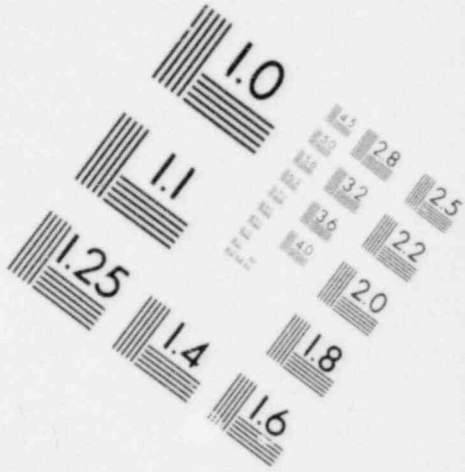
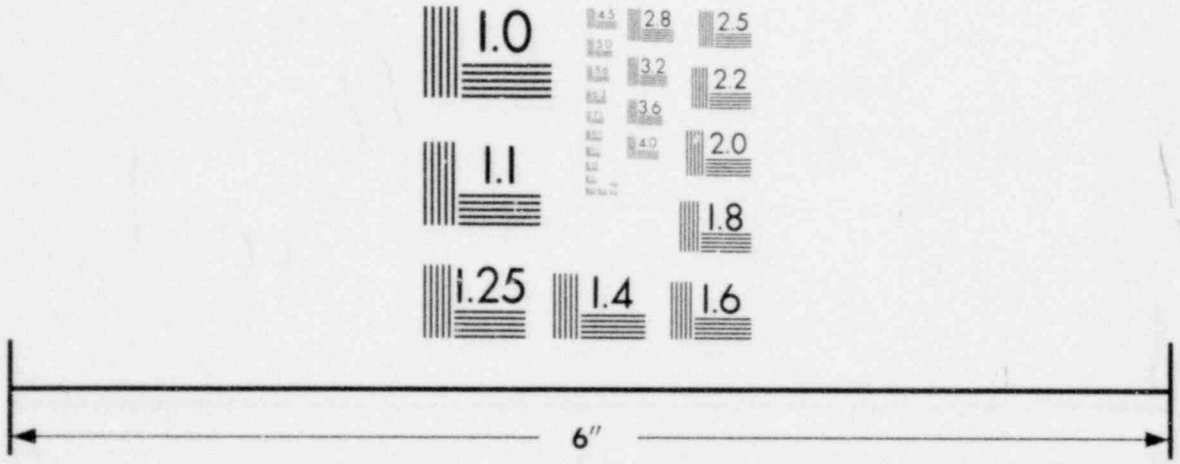
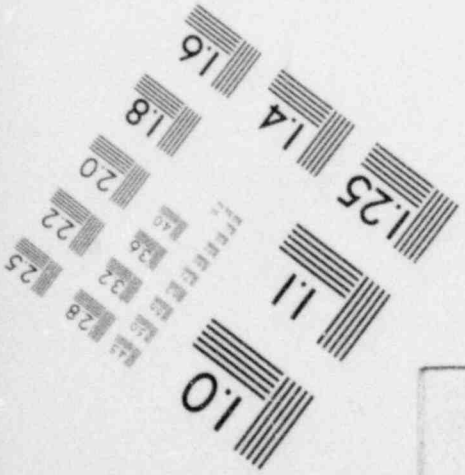
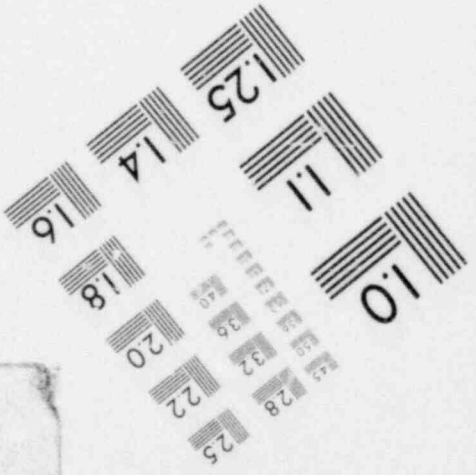


IMAGE EVALUATION
TEST TARGET (MT-3)



MICROCOPY RESOLUTION TEST CHART





WESTINGHOUSE PWR SYSTEMS DIVISION

WESTINGHOUSE FORM 6213C

REV. NO.	REV. DATE	AUTHOR	DATE	CHK'D BY	DATE	CHK'D BY	DATE

TITLE: COMPILATION OF MODE DISPLACEMENTS FOR ALA

S.O. 145 | PROJECT ALA | AUTHOR SDH | CALC. NO. | DATE 12/21/77 | CHK'D BY MS 12/21/77 | FILE NO. 14B | GROUP RCSA | DATE 12-21-77 | CHK'D BY [illegible] | DATE | PAGE 25 OF 54

SHOCK DIRECTION Z, Y

SHOCK TYPE ΦBE

SUPPORT CASE 4,2,5

MODE 3 FREQUENCY 8.78

NODE POINT	D_x	D_y	D_z	θ_x	θ_y	θ_z
200	-.000	.000	-.000	-.0000	-.0000	-.0000
1210	.000	.000	-.011	.0000	-.0002	-.0000
1220	.000	.000	-.024	.0000	.0000	.0000
1230	-.000	.000	-.015	.0000	.0001	.0000
227	.000	.000	-.016	.0000	.0001	.0000
1235	-.001	.000	.091	.0002	.0001	.0000
1240	-.007	.000	.129	.0003	.0001	.0000
1250	.007	-.002	-.015	.0000	.0001	-.0000
1255	.007	-.002	-.015	-.0000	.0001	-.0000
1260	.007	-.001	-.014	-.0000	.0000	.0000
1265	.004	-.000	-.013	-.0000	-.0000	.0000
1270	.004	-.000	-.012	.0000	-.0000	.0000
1275	-.002	-.001	-.009	.0001	-.0000	.0000
1285	-.013	-.001	.012	.0001	-.0000	.0001
1290	-.001	.000	-.001	.0000	-.0000	-.0000
1295	-.000	.000	-.000	-.0000	-.0000	-.0000

MODE 4 FREQUENCY 9.79

NODE POINT	D_x	D_y	D_z	θ_x	θ_y	θ_z
200	.000	-.000	-.000	.0000	.0000	.0000
1210	-.000	.000	.000	-.0000	.0000	.0000
1220	-.000	-.000	.000	-.0000	-.0000	.0000
1230	-.000	-.000	.000	-.0000	-.0000	-.0000
227	-.000	-.000	.000	-.0000	-.0000	-.0000
1235	-.000	-.000	.000	.0000	-.0000	.0000
1240	-.001	-.000	.003	.0000	-.0000	.0000
1250	-.001	.000	.000	-.0000	-.0000	-.0000
1255	-.002	.000	.001	-.0000	-.0000	-.0000
1260	-.006	.000	.002	-.0000	-.0000	-.0001
1265	-.009	.001	.003	-.0000	-.0000	-.0001
1270	-.010	.001	.003	-.0000	-.0000	-.0001
1275	.001	.001	-.001	-.0000	-.0000	-.0001
1285	.028	.001	-.010	-.0001	-.0000	-.0002
1290	.001	-.007	.001	.0000	.0000	.0000
1295	.000	-.000	.000	.0000	.0000	.0000

NOTE: 1) D_x, D_y, D_z are in inches

2) θ_x, θ_y, θ_z are in radians

RUN.NO. PCGSTAY

WESTINGHOUSE PWR SYSTEMS DIVISION

TITLE: COMPILATION OF MODE DISPLACEMENTS FOR ALA

PROJECT: ALA | S.O. 145 | PAGE 26 OF 54

AUTHOR: SDH | DATE: 10/21/77 | CALC. NO.

CHK'D. BY: MES | DATE: 10/24/77 | FILE NO. 148

CHK'D. BY: [illegible] | DATE: 10-31-77 | GROUP RCSA

REV. NO. | REV. DATE | AUTHOR | DATE | CHK'D. BY | DATE | CHK'D. BY | DATE

SHOCK DIRECTION Z, Y

SHOCK TYPE ΦBE

SUPPORT CASE 4,2,5

MODE 5 FREQUENCY 15.46							MODE 6 FREQUENCY 18.09						
NODE POINT	D_x	D_y	D_z	θ_x	θ_y	θ_z	NODE POINT	D_x	D_y	D_z	θ_x	θ_y	θ_z
200	-.000	.000	-.000	.0000	-.0000	-.0000	200	.000	.000	.000	-.0000	.0000	-.0000
1210	-.000	.018	-.002	.0000	-.0000	-.0002	1210	.000	.001	.002	-.0000	.0000	-.0000
1220	.000	.041	-.005	.0000	-.0000	-.0001	1220	.001	.003	.005	-.0000	.0000	-.0000
1230	.002	.043	-.003	.0000	.0000	-.0000	1230	.001	.003	.004	-.0000	-.0000	.0000
227	.001	.043	-.004	.0000	.0000	-.0000	227	.001	.003	.004	-.0000	-.0000	.0000
1235	.002	.050	-.000	.0000	.0000	.0000	1235	.001	.004	.000	-.0000	-.0000	.0000
1240	-.002	.052	-.003	-.0000	.0000	.0000	1240	-.000	.004	.002	.0000	-.0000	.0000
1250	-.000	.041	-.007	.0001	-.0000	-.0001	1250	.002	.005	.007	-.0001	.0000	.0000
1255	-.004	.041	-.020	.0003	-.0000	-.0001	1255	.005	.005	.016	-.0002	.0000	.0001
1260	-.013	.039	-.046	.0004	-.0000	-.0001	1260	.011	.007	.031	-.0001	.0000	.0001
1265	-.017	.036	-.061	.0003	-.0000	-.0001	1265	.012	.007	.032	.0001	.0000	.0000
1270	-.017	.033	-.048	.0002	-.0000	-.0001	1270	.012	.003	.033	.0000	.0000	.0000
1275	-.010	-.000	-.029	.0002	-.0000	-.0001	1275	.008	.003	.023	-.0001	.0000	.0000
1285	.006	-.000	.012	.0002	-.0000	-.0001	1285	-.005	.003	.013	-.0002	.0000	.0001
1290	-.004	-.001	-.017	.0001	-.0001	-.0000	1290	.006	.002	.015	-.0001	.0001	.0000
1295	-.001	-.000	-.001	.0000	-.0000	-.0000	1295	.001	.000	.001	-.0000	.0000	-.0000

NOTE: 1) D_x, D_y, D_z are in inches

2) θ_x, θ_y, θ_z are in radians

RUN NO. PCGSTAY

WESTINGHOUSE FORM 552130

REV. NO. | REV. DATE

SHOCK DIRECTION Z, Y
SHOCK TYPE ΦBE
SUPPORT CASE 4, 2, 5

MODE 7 FREQUENCY 19.16

NODE POINT	D_x	D_y	D_z	θ_x	θ_y	θ_z
200	.000	-.000	-.000	.0000	-.0000	.0000
1210	.000	-.000	-.000	.0000	-.0000	.0000
1220	.000	-.000	-.000	.0000	-.0000	-.0000
1230	.001	-.000	-.000	.0000	.0000	-.0000
227	.001	-.000	-.000	.0000	.0000	-.0000
1235	001	-.000	-.000	.0000	.0000	.0000
1240	-.001	-.000	-.000	-.0000	.0000	.0000
1250	.000	.000	-.000	.0000	-.0000	-.0000
1255	.000	.000	-.000	.0000	-.0000	-.0000
1260	.001	-.000	-.000	.0000	-.0000	-.0000
1265	.000	-.000	-.000	-.0000	-.0000	-.0000
1270	-.000	-.000	-.000	-.0000	-.0000	-.0000
1275	-.000	-.000	-.000	.0000	-.0000	-.0000
1285	.000	-.000	.000	.0000	-.0000	-.0000
1290	-.000	-.000	-.000	.0000	-.0000	-.0000
1295	-.000	-.000	-.000	.0000	-.0000	.0000

MODE 8 FREQUENCY 29.59

NODE POINT	D_x	D_y	D_z	θ_x	θ_y	θ_z
200	-.000	-.000	.000	.0000	-.0000	-.0000
1210	-.000	.000	.001	-.0000	.0000	-.0000
1220	-.000	.000	.001	-.0000	-.0000	.0000
1230	-.000	-.000	.001	-.0000	-.0000	-.0000
227	-.000	-.000	.001	-.0000	-.0000	-.0000
1235	.000	-.000	.000	-.0000	-.0000	-.0000
1240	-.000	-.000	.000	.0000	-.0000	.0000
1250	-.001	.000	.001	-.0000	-.0000	-.0000
1255	-.001	.000	.001	-.0000	-.0000	-.0000
1260	-.001	.000	.001	-.0000	.0000	-.0000
1265	-.002	.000	.001	-.0000	.0000	-.0000
1270	-.001	.000	.000	-.0000	.0000	-.0000
1275	-.000	.000	.000	-.0000	.0000	-.0000
1285	-.000	.000	.000	.0000	.0000	.0000
1290	-.001	-.000	-.002	-.0000	-.0000	-.0000
1295	-.000	-.000	-.000	.0000	-.0000	.0000

NOTE: 1) D_x, D_y, D_z are in inches
2) θ_x, θ_y, θ_z are in radians

RUN NO. PCGSTAV

AUTHOR | DATE | CHK'D. BY | DATE | CHK'D. BY | DATE

S.O. 145
CALC. NO. —
FILE NO. 149
GROUP RCSA

TITLE COMPILATION OF MODE DISPLACEMENTS FOR ALA
PROJECT ALA
AUTHOR S.P.H. DATE 10/24/77
CHK'D. BY R.S. DATE 10/24/77
CHK'D. BY [illegible] DATE 10-31-77
PAGE 27 OF 54

WESTINGHOUSE PWR SYSTEMS DIVISION

SHOCK DIRECTION Z, Y

SHOCK TYPE ϕBE

SUPPORT CASE 4,25

MODE 10 FREQUENCY 35.07

NODE POINT	D_x	D_y	D_z	θ_x	θ_y	θ_z
200	-.000	-.000	.000	.0000	.0000	.0000
1210	-.000	.000	.000	-.0000	.0000	-.0000
1220	-.000	-.000	.000	-.0000	-.0000	.0000
1230	-.000	-.000	.000	-.0000	-.0000	-.0000
227	-.000	-.000	.000	-.0000	-.0000	-.0000
1235	.000	-.000	.000	-.0000	-.0000	-.0000
1240	-.000	-.000	.000	.0000	-.0000	-.0000
1250	-.000	.000	.000	.0000	-.0000	-.0000
1255	-.000	.000	.000	.0000	-.0000	-.0000
1260	-.000	000	-.000	.0000	-.0000	-.0000
1265	-.000	-.000	.000	-.0000	-.0000	-.0000
1270	-.001	.000	.000	-.0000	-.0000	-.0000
1275	-.000	.000	-.000	-.0000	-.0000	-.0000
1285	-.000	.000	.000	.0000	-.0000	-.0000
1290	.000	-.000	.001	.0000	.0000	.0000
1295	-.000	-.000	.000	.0000	.0000	.0000

NOTE: 1) D_x, D_y, D_z are in inches

2) θ_x, θ_y, θ_z are in radians

RUN NO. PCGSTAV

REV. NO. | BY | DATE

AUTHOR | DATE | CHK'D. BY | DATE

TITLE COMPILATION OF MODE DISPLACEMENTS FOR ALA

PROJECT ALA | AUTHOR SDH 10/24/77 | DATE | CHK'D. BY RS 10/24/77 | DATE | PAGE 28 OF 54

S.O. 145 | CALC. NO. | FILE NO. 148 | GROUP PCSA | CHK'D. BY [illegible] 10-24-77 | DATE

WESTINGHOUSE PWR SYSTEMS DIVISION

APPENDIX B.7

SSE (DBE) x,y Support Case 4-2-5

WESTINGHOUSE FORM 56213C

WESTINGHOUSE PWR SYSTEMS DIVISION

REV. NO. | REV. DATE | AUTHOR | DATE | CHK'D BY | DATE | CHK'D BY | DATE

TITLE COMPILATION OF MODE DISPLACEMENTS FOR ALA

PROJECT ALA | S.O. 145 | CALC. NO. 148 | GROUP RCSA | AUTHOR [illegible] DATE 10/21/77 | CHK'D. BY [illegible] DATE 10-21-77 | CHK'D. BY [illegible] DATE 10-21-77 | PAGE 29 OF 54

SHOCK DIRECTION X,Y

SHOCK TYPE SSE (DBE)

SUPPORT CASE 4,2,5

MODE 1 FREQUENCY 5.79

NODE POINT	D_x	D_y	D_z	θ_x	θ_y	θ_z
200	.000	.000	.000	.0000	.0000	-.0000
1210	.000	.000	.001	-.0000	.0000	-.0000
1220	.000	.001	.001	-.0000	.0000	-.0000
1230	.000	.001	.001	-.0000	-.0000	-.0000
227	.000	.001	.001	-.0000	-.0000	-.0000
1235	.000	.001	-.000	-.0000	-.0000	.0000
1240	.000	.001	-.002	-.0000	-.0000	.0000
1250	-.000	.001	.001	-.0000	-.0000	.0000
1255	-.000	.001	.003	-.0000	.0000	.0000
1260	.000	.002	.007	-.0001	.0000	-.0000
1265	.001	.004	.008	-.0000	.0000	-.0000
1270	.003	.007	.009	.0001	.0000	-.0000
1275	.011	-.000	.032	.0002	.0000	-.0001
1285	.028	-.000	.080	.0003	.0000	-.0001
1290	.006	-.001	.016	.0001	.0002	-.0000
1295	.001	-.000	.000	.0000	.0000	-.0000

MODE 2 FREQUENCY 7.69

NODE POINT	D_x	D_y	D_z	θ_x	θ_y	θ_z
200	-.000	-.000	-.000	.0000	-.0000	.0000
1210	-.002	-.000	-.002	.0000	-.0000	.0000
1220	-.005	-.002	-.003	.0000	.0000	.0000
1230	-.003	.000	-.002	.0000	.0000	-.0001
227	-.005	.000	-.002	.0000	.0000	-.0001
1235	.026	.000	.000	.0000	.0000	-.0002
1240	.184	.000	.011	.0000	.0000	-.0004
1250	-.007	.001	-.001	.0000	.0000	-.0001
1255	-.009	.001	-.001	-.0000	.0000	-.0001
1260	-.010	.001	-.001	-.0000	.0001	-.0001
1265	-.008	.001	-.002	-.0000	.0001	-.0000
1270	-.004	.000	-.002	.0000	.0000	-.0000
1275	-.001	.000	-.002	.0000	.0000	-.0000
1285	.005	.000	-.001	.0000	.0000	-.0000
1290	-.001	-.001	-.002	.0000	-.0000	.0000
1295	-.000	-.000	-.000	.0000	-.0000	.0000

NOTE: 1) D_x, D_y, D_z are in inches

2) θ_x, θ_y, θ_z are in radians

RUN NO. PCGST7H

WESTINGHOUSE PWR SYSTEMS DIVISION

TITLE COMPILATION OF MODE DISPLACEMENTS FOR ALA

PROJECT ALA | S.O. 145 | PAGE 30 OF 54

AUTHOR SQH 10/21/77 | CALC. NO. | DATE | CHK'D. BY | DATE

FILE NO. 148 | GROUP RCSA

REV. NO. | REV. DATE | AUTHOR | DATE | CHK'D BY | DATE | CHK'D BY | DATE

SHOCK DIRECTION X,Y

SHOCK TYPE SSE (DBE)

SUPPORT CASE 4,2,5

MODE 3 FREQUENCY 8.78

NODE POINT	D_x	D_y	D_z	θ_x	θ_y	θ_z
200	-.000	.000	-.000	-.0000	-.0000	-.0000
1210	.000	.000	-.001	.0000	-.0000	-.0000
1220	.000	.000	-.003	.0000	.0000	.0000
1230	-.000	.000	-.002	.0000	.0000	.0000
227	.000	.000	-.002	.0000	.0000	.0000
1235	-.000	.000	.000	.0000	.0000	.0000
1240	-.001	.000	.015	.0000	.0000	.0000
1250	.001	-.000	-.002	.0000	.0000	-.0000
1255	.001	-.000	-.002	-.0000	.0000	-.0000
1260	.001	-.000	-.002	-.0000	.0000	.0000
1265	.001	-.000	-.002	-.0000	-.0000	.0000
1270	.000	-.000	-.001	.0000	-.0000	.0000
1275	-.000	-.000	-.001	.0000	-.0000	.0000
1285	-.002	-.000	.001	.0000	-.0000	.0000
1290	-.000	.000	-.000	.0000	-.0000	-.0000
1295	-.000	.000	-.000	-.0000	-.0000	-.0000

MODE 4 FREQUENCY 9.79

NODE POINT	D_x	D_y	D_z	θ_x	θ_y	θ_z
200	.000	-.000	-.000	.0000	.0000	.0000
1210	-.000	.000	.001	-.0000	.0000	.0000
1220	-.000	-.000	.001	-.0000	-.0000	.0000
1230	-.000	-.000	.000	-.0000	-.0000	-.0000
227	-.000	-.000	.000	-.0000	-.0000	-.0000
1235	-.000	-.000	.000	.0000	-.0000	.0000
1240	-.002	-.000	.004	.0000	-.0000	.0000
1250	-.002	.000	.000	-.0000	-.0000	-.0000
1255	-.007	.001	.002	-.0001	-.0001	-.0001
1260	-.020	.001	.007	-.0001	-.0001	-.0002
1265	-.030	.002	.010	-.0001	-.0001	-.0003
1270	-.031	.003	.010	-.0001	-.0001	-.0003
1275	.004	.003	-.002	-.0001	-.0000	-.0003
1285	.008	.004	-.031	-.0002	-.0000	-.0004
1290	.003	-.022	.002	.0000	.0000	.0001
1295	.001	-.001	.001	.0000	.0000	.0000

NOTE: 1) D_x, D_y, D_z are in inches

2) θ_x, θ_y, θ_z are in radians

RUN NO. RGST7H

WESTINGHOUSE PWR SYSTEMS DIVISION

TITLE: COMPILATION OF MODE DISPLACEMENTS FOR ALA

PROJECT: ALA | S.O. 145 | PAGE 31 OF 54

AUTHOR: S.D.H. 10/21/77 | CALC. NO. | DATE

CHK'D. BY: W.S. 10/21/77 | FILE NO. 148 | DATE

CHK'D. BY: [illegible] 10-21-77 | GROUP RCSA | DATE

REV. NO. | REV. DATE | AUTHOR | DATE | CHK'D. BY | DATE | CHK'D. BY | DATE

SHOCK DIRECTION X,Y

SHOCK TYPE SSE (DBE)

SUPPORT CASE 4,2,5

MODE 5 FREQUENCY = 15.46

NODE POINT	D_x	D_y	D_z	θ_x	θ_y	θ_z
200	-.000	.000	-.000	.0000	-.0000	-.0000
1210	-.000	.011	-.001	.0000	-.0000	-.0002
1220	.000	.027	-.003	.0000	-.0000	-.0001
1230	.001	.029	-.002	.0000	.0000	-.0000
227	.001	.029	-.003	.0000	.0000	-.0000
1235	.001	.034	-.000	.0000	.0000	.0000
1240	-.001	.035	-.007	-.0000	.0000	.0000
1250	-.000	.027	-.005	.0001	-.0000	-.0000
1255	-.003	.027	-.013	.0002	-.0000	-.0001
1260	-.009	.023	-.031	.0003	-.0000	-.0001
1265	-.011	.011	-.039	.0002	-.0000	-.0001
1270	-.011	.002	-.032	.0001	-.0000	-.0000
1275	-.007	-.000	-.019	.0001	-.0000	-.0000
1285	.003	-.000	.008	.0002	-.0000	-.0001
1290	-.004	-.000	-.012	.0001	-.0001	-.0000
1295	-.000	-.000	-.000	.0000	-.0000	-.0000

MODE 6 FREQUENCY 18.09

NODE POINT	D_x	D_y	D_z	θ_x	θ_y	θ_z
200	.000	.000	.000	-.0000	.0000	-.0000
1210	.000	.001	.002	-.0000	.0000	-.0000
1220	.001	.002	.004	-.0000	.0000	-.0000
1230	.001	.002	.003	-.0000	-.0000	.0000
227	.001	.002	.003	-.0000	-.0000	.0000
1235	.001	.003	.000	-.0000	-.0000	.0000
1240	-.000	.003	.002	.0000	-.0000	.0000
1250	.002	.003	.005	-.0001	.0000	.0000
1255	.004	.004	.012	-.0002	.0000	.0001
1260	.008	.005	.024	-.0001	.0000	.0000
1265	.009	.005	.024	.0000	.0000	.0000
1270	.009	.002	.025	.0000	.0000	.0000
1275	.006	.002	.017	-.0001	.0000	.0000
1285	-.004	.002	-.010	-.0002	.0000	.0001
1290	.004	.002	.012	-.0001	.0001	.0000
1295	.000	.000	.000	-.0000	.0000	-.0000

NOTE: 1) D_x, D_y, D_z are in inches

2) θ_x, θ_y, θ_z are in radians

RUN NO. PCGST711

WESTINGHOUSE PWR SYSTEMS DIVISION

TITLE: COMPILATION OF MODE DISPLACEMENTS FOR ALA

PROJECT: ALA | S.O. 145 | PAGE 32 OF 54

AUTHOR: SDH | CALC. NO. | DATE: 10/21/77

CHK'D. BY: [illegible] 10/24/77 | FILE NO. 148 | DATE

CHK'D. BY: [illegible] 10-21-77 | GROUP RCSA | DATE

REV. | DATE | AUTHOR

REV. | DATE | CHK'D. BY

REV. | DATE

SHOCK DIRECTION X,Y

SHOCK TYPE SSE (DBE)

SUPPORT CASE 4,2,5

MODE 7 FREQUENCY 19.16

NODE POINT	D_x	D_y	D_z	θ_x	θ_y	θ_z
200	.000	-.000	-.000	.0000	-.0000	.0000
1210	.001	-.003	-.000	.0000	-.0000	.0000
1220	.003	-.004	-.000	.0000	-.0000	-.0000
1230	.007	-.001	-.000	.0000	.0000	-.0000
227	.006	-.001	-.000	.0000	.0000	-.0000
1235	.015	-.001	-.000	.0000	.0000	.0000
1240	-.010	-.001	-.000	-.0000	.0000	.0001
1250	.005	.000	-.000	.0000	-.0000	-.0000
1255	.003	.000	-.001	.0000	-.0000	-.0000
1260	.001	-.000	-.002	.0000	-.0000	-.0000
1265	.000	-.000	-.002	-.0000	-.0000	-.0000
1270	-.000	-.000	-.002	-.0000	-.0000	-.0000
1275	-.000	-.000	-.001	.0000	-.0000	-.0000
1285	.000	-.000	.001	.0000	-.0000	-.0000
1290	-.000	-.000	-.000	.0000	-.0000	-.0000
1295	-.000	-.000	-.000	.0000	-.0000	.0000

MODE 8 FREQUENCY 29.59

NODE POINT	D_x	D_y	D_z	θ_x	θ_y	θ_z
200	-.000	-.000	.000	.0000	-.0000	-.0000
1210	-.000	.000	.001	-.0000	.0000	-.0000
1220	-.000	.000	.002	-.0000	-.0000	.0000
1230	-.000	-.000	.001	-.0000	-.0000	-.0000
227	-.000	-.000	.001	-.0000	-.0000	-.0000
1235	-.000	-.000	.000	-.0000	-.0000	-.0000
1240	-.000	-.000	.000	.0000	-.0000	.0000
1250	-.001	.000	.001	-.0000	-.0000	-.0000
1255	-.002	.000	.001	-.0000	-.0000	-.0000
1260	-.005	.000	.002	-.0000	.0000	-.0000
1265	-.004	.000	.001	-.0000	.0000	-.0000
1270	-.002	.000	.001	-.0000	.0000	-.0000
1275	-.000	.000	.000	-.0000	.0000	-.0000
1285	-.000	.000	.000	.0000	.0000	.0000
1290	-.001	-.000	-.003	-.0000	.0000	-.0000
1295	-.000	-.000	-.000	.0000	-.0000	.0000

NOTE: 1) D_x, D_y, D_z are in inches

2) θ_x, θ_y, θ_z are in radians

RUN NO. PCGST7H

WESTINGHOUSE PWR SYSTEMS DIVISION

WESTINGHOUSE FORM 55213C

REV. NO. | REV. DATE | AUTHOR | DATE | CHK'D BY | DATE | CHK'D BY | DATE

TITLE: COMPILATION OF MODE DISPLACEMENTS FOR ALA

S.O. 145 | PROJECT ALA | AUTHOR S.D.H. 10/21/77 | CALC. NO. | DATE | CHK'D BY M.S. 10/21/77 | FILE NO. 145 | DATE | CHK'D BY [illegible] 10-21-77 | GROUP RCSA | DATE | PAGE 33 OF 54

SHOCK DIRECTION X,Y

SHOCK TYPE SSE (DBE)

SUPPORT CASE 4,2,5

MODE 10 FREQUENCY 35.07

NODE POINT	D_x	D_y	D_z	θ_x	θ_y	θ_z
200	-.000	-.000	.000	.0000	.0000	.0000
1210	-.000	.000	.000	-.0000	.0000	-.0000
1220	-.000	-.000	.001	-.0000	-.0000	.0000
1230	-.000	-.000	.000	-.0000	-.0000	-.0000
227	-.000	-.000	.000	-.0000	-.0000	-.0000
1235	.000	-.000	.000	-.0000	-.0000	-.0000
1240	-.000	-.000	.000	.0000	-.0000	-.0000
1250	-.000	.000	.000	.0000	-.0000	-.0000
1255	-.000	.000	.000	.0000	-.0000	-.0000
1260	-.000	.000	-.000	.0000	-.0000	-.0000
1265	-.001	-.000	.000	-.0000	-.0000	-.0000
1270	-.001	.000	.000	-.0000	-.0000	-.0000
1275	-.000	.000	-.000	-.0000	-.0000	-.0000
1285	-.000	.000	.000	.0000	-.0000	-.0000
1290	.000	-.000	.002	.0000	.0000	.0000
1295	-.000	-.000	.000	.0000	.0000	.0000

MODE 11 FREQUENCY 36.66

NODE POINT	D_x	D_y	D_z	θ_x	θ_y	θ_z
200	.000	.000	-.000	-.0000	.0000	-.0000
1210	.000	-.000	.001	-.0000	.0000	.0000
1220	.000	-.000	.001	-.0000	-.0000	-.0000
1230	.000	-.000	.001	-.0000	-.0000	.0000
227	.000	-.000	.001	-.0000	-.0000	.0000
1235	-.000	-.000	.000	-.0000	-.0000	.0000
1240	.000	-.000	.000	.0000	-.0000	-.0000
1250	-.000	.000	.001	.0000	-.0000	.0000
1255	.000	.000	.000	.0000	-.0000	[illegible]
1260	.001	-.000	-.000	.0000	-.0000	.0000
1265	.001	-.000	-.000	.0000	-.0000	.0000
1270	001	.000	-.000	-.0000	-.0000	.0000
1275	.000	.000	-.000	.0000	.0000	.0000
1285	.000	.000	.000	.0000	.0000	.0000
1290	000	.001	-.000	-.0000	-.0000	-.0000
1295	.000	.000	.000	-.0000	.0000	-.0000

NOTE: 1) D_x, D_y, D_z are in inches

2) θ_x, θ_y, θ_z are in radians

RUN NO. PCGST7H

APPENDIX B.8

SSE (DBE) y,z Support Case 4-2-5

SHOCK DIRECTION 7,4

SHOCK TYPE SSE (DBE)

SUPPORT CASE 1,2,5

MODE 1 FREQUENCY 9.79

NODE POINT	D_x	D_y	D_z	θ_x	θ_y	θ_z
200	.000	.000	.000	.0000	.0000	-.0000
1210	.000	.001	.002	-.0000	.0000	-.0000
1220	.000	.002	.004	-.0000	.0000	-.0000
1230	.000	.002	.002	-.0000	-.0000	-.0000
227	.000	.002	.002	-.0000	-.0000	-.0000
1235	.010	.002	-.000	-.0000	-.0000	.0000
1240	.000	.002	-.005	-.0000	-.0000	.0000
1250	-.000	.004	.004	-.0001	-.0000	.0000
1255	-.000	.004	.010	-.0001	.0000	.0000
1260	.000	.007	.022	-.0002	.0000	-.0000
1265	.003	.013	.024	-.0000	.0001	-.0000
1270	.008	.006	.026	.0004	.0001	-.0001
1275	.033	-.001	.092	.0007	.0001	-.0002
1285	.082	-.001	.233	.0008	.0001	-.0001
1290	.017	-.002	.047	.0004	.0004	-.0001
1295	.001	-.000	.001	.0000	.0001	-.0000

MODE 2 FREQUENCY 7.69

NODE POINT	D_x	D_y	D_z	θ_x	θ_y	θ_z
200	-.000	-.000	-.000	.0000	-.0000	.0000
1210	-.000	-.000	-.000	.0000	-.0000	.0000
1220	-.000	-.000	-.000	.0000	.0000	.0000
1230	-.000	.000	-.000	.0000	.0000	-.0000
227	-.000	.000	-.000	.0000	.0000	-.0000
1235	.001	.000	.000	.0000	.0000	-.0000
1240	.005	.000	.000	.0000	.0000	-.0000
1250	-.000	.000	-.000	.0000	.0000	-.0000
1255	-.000	.000	-.000	-.0000	.0000	-.0000
1260	-.000	.000	-.000	-.0000	.0000	-.0000
1265	-.000	.000	-.000	-.0000	.0000	-.0000
1270	-.000	.000	-.000	.0000	.0000	-.0000
1275	-.000	.000	-.000	.0000	.0000	-.0000
1285	.000	.000	-.000	.0000	.0000	-.0000
1290	-.000	-.000	-.000	.0000	-.0000	.0000
1295	-.000	-.000	-.000	.0000	-.0000	.0000

NOTE: 1) D_x, D_y, D_z are in inches
2) θ_x, θ_y, θ_z are in radians

RUN NO. PCGSTEY

TITLE: COMPILATION OF MODE DISPLACEMENTS FOR ALA

PROJECT: ALA

AUTHOR: S.D.H. DATE: 10/21/77

CALC. NO.

FILE NO. 14B

GROUP: RCSA

CHK'D. BY: W.S. DATE: 10/31/77

CHK'D. BY: [illegible] DATE: 10-31-77

S.O. 145

PAGE 34 OF 54

WESTINGHOUSE PWR SYSTEMS DIVISION

WESTINGHOUSE FORM 552136

WESTINGHOUSE PWR SYSTEMS DIVISION

TITLE: COMPILATION OF NODE DISPLACEMENTS FOR ALA

PROJECT: ALA | S.O.: 145 | PAGE: 35 of 54

AUTHOR: S.D.H. 10/24/77 | CALC. NO. | DATE | CHK'D BY: [illegible] 10/24/77 | DATE | FILE NO.: 14B | GROUP: RCSA | DATE

SHOCK DIRECTION: Z,Y

SHOCK TYPE: SSE (DBE)

SUPPORT CASE: 4,2,5

MODE 3 FREQUENCY 8.78

NODE POINT	D_x	D_y	D_z	θ_x	θ_y	θ_z
200	-.000	.000	-.000	-.0000	-.0000	-.0000
1210	.000	.000	-.009	.0000	-.0001	-.0000
1220	.000	.000	-.019	.0000	.0000	.0000
1230	-.000	.000	-.012	.0000	.0001	.0000
227	.000	.000	-.012	.0000	.0001	.0000
1235	-.001	.000	.001	.0001	.0001	.0000
1240	-.009	.000	.100	.0002	.0001	.0000
1250	.009	-.001	-.012	.0000	.0001	-.0000
1255	.005	-.001	-.012	-.0000	.0000	-.0000
1260	.009	-.001	-.011	-.0000	.0000	.0000
1265	.009	-.000	-.010	-.0000	-.0000	.0000
1270	.003	-.000	-.009	.0000	-.0000	.0000
1275	-.001	-.001	-.003	.0001	-.0000	.0000
1285	-.010	-.001	.009	.0001	-.0000	.0001
1290	-.001	.003	-.001	.0000	-.0000	-.0000
1295	-.000	.000	-.000	-.0000	-.0000	-.0000

MODE 4 FREQUENCY 9.79

NODE POINT	D_x	D_y	D_z	θ_x	θ_y	θ_z
200	.000	-.000	-.000	.0000	.0000	.0000
1210	-.000	.000	.000	-.0000	.0000	.0000
1220	-.000	-.000	.000	-.0000	-.0000	.0000
1230	-.000	-.000	.000	-.0000	-.0000	-.0000
227	-.000	-.000	.000	-.0000	-.0000	-.0000
1235	-.000	-.000	.000	.0000	-.0000	.0000
1240	-.001	-.000	.002	.0000	-.0000	.0000
1250	-.001	.000	.000	-.0000	-.0000	-.0000
1255	-.002	.000	.001	-.0000	-.0000	-.0000
1260	-.004	.000	.002	-.0000	-.0000	-.0001
1265	-.008	.001	.003	-.0000	-.0000	-.0001
1270	-.008	.001	.003	-.0000	-.0000	-.0001
1275	.001	.001	-.000	-.0000	-.0000	-.0001
1285	.023	.001	-.008	-.0000	-.0009	-.0001
1290	.001	-.004	.000	.0000	[illegible]	.0000
1295	.000	-.000	.000	.0000	.0000	.0000

NOTE: 1) D_x, D_y, D_z are in inches
2) θ_x, θ_y, θ_z are in radians

RUN NO. PCGSTEY

REV NO | REV DATE | AUTHOR | DATE | CHK'D BY | DATE

WESTINGHOUSE PWR SYSTEMS DIVISION

WESTINGHOUSE FORM 552136

REV. NO. | REV. DATE

SHOCK DIRECTION Z, Y
SHOCK TYPE SSE (DBE)
SUPPORT CASE 4, 2, 5

MODE 5 FREQUENCY 19.96

NODE POINT	D_x	D_y	D_z	θ_x	θ_y	θ_z
200	-.000	.000	-.000	.0000	-.0000	-.0000
1210	-.000	.019	-.002	.0000	-.0000	-.0002
1220	.000	.035	-.004	.0000	-.0000	-.0001
1230	.001	.037	-.003	.0000	.0000	-.0000
227	.001	.036	-.003	.0000	.0000	-.0000
1235	.002	.043	-.000	.0000	.0000	.0000
1240	-.002	.044	-.003	-.0000	.0000	.0000
1250	-.000	.035	-.006	.0001	-.0000	-.0000
1255	-.004	.035	-.017	.0003	-.0000	-.0001
1260	-.011	.029	-.039	.0003	-.0000	-.0001
1265	-.019	.019	-.044	.0002	-.0000	-.0001
1270	-.015	.002	-.041	.0002	-.0000	-.0001
1275	-.009	-.000	-.029	.0002	-.0000	-.0001
1285	.004	-.000	.010	.0002	-.0000	-.0001
1290	-.005	-.001	-.015	.0001	-.0001	-.0000
1295	-.000	-.000	-.000	.0000	-.0000	-.0000

MODE 6 FREQUENCY 18.09

NODE POINT	D_x	D_y	D_z	θ_x	θ_y	θ_z
200	.000	.000	.000	-.0000	.0000	-.0000
1210	.000	.001	.002	-.0000	.0000	-.0000
1220	.001	.003	.006	-.0000	.0000	-.0000
1230	.001	.003	.009	-.0000	-.0000	.0000
227	.001	.003	.009	-.0000	-.0000	.0000
1235	.001	.004	.000	-.0000	-.0000	.0000
1240	-.000	.004	.003	.0000	-.0000	.0000
1250	.002	.005	.007	-.0001	.0000	.0000
1255	.006	.005	.018	-.0002	.0000	.0001
1260	.012	.004	.039	-.0001	.0000	.0001
1265	.013	.007	.035	.0001	.0000	.0000
1270	.014	.003	.036	.0000	.0000	.0000
1275	.009	.003	.025	-.0001	.0000	.0001
1285	-.005	.001	-.014	-.0002	.0000	.0001
1290	.006	.002	.017	-.0001	.0001	.0000
1295	.001	.000	.001	-.0000	.0000	-.0000

NOTE: 1) D_x, D_y, D_z are in inches
2) θ_x, θ_y, θ_z are in radians

RUN NO. PCGSTEY

AUTHOR | DATE | CHK'D. BY | DATE | CHK'D. BY | DATE

S.O. 145
PROJECT ALA
TITLE COMPILATION OF MODE DISPLACEMENTS FOR ALA
AUTHOR SDH 10/21/77
CALC. NO.
DATE CHK'D. BY M.S. 10/24/77
FILE NO. 148
GROUP RCSA
DATE
PAGE 36 OF 54

WESTINGHOUSE PWR SYSTEMS DIVISION

WESTINGHOUSE FORM 92130

REV. NO.	REV. DATE	AUTHOR	DATE	CHK'D. BY	DATE	CHK'D. BY	DATE

TITLE: COMPILATION OF MODE DISPLACEMENTS FOR ALA

S.O. 145 | PROJECT ALA | AUTHOR S.D.H. 12/21/77 | CALC NO. | DATE | CHK'D. BY M.S. 12/21/77 | FILE NO. 149 | DATE | CHK'D. BY [illegible] 12-21-77 | GROUP RCSA | PAGE 37 OF 54

SHOCK DIRECTION Z,Y

SHOCK TYPE SSE (DBE)

SUPPORT CASE 1,2,5

MODE 7 FREQUENCY 19.16

NODE POINT	D_x	D_y	D_z	θ_x	θ_y	θ_z
200	.000	-.000	-.000	.0000	-.0000	.0000
1210	.000	-.000	-.000	.0000	-.0000	.0000
1220	.000	-.000	-.000	.0000	-.0000	-.0000
1230	.001	-.000	-.000	.0000	.0000	-.0000
227	.001	-.000	-.000	.0000	.0000	-.0000
1235	.001	-.000	-.000	.0000	.0000	.0000
1240	-.001	-.000	-.000	-.0000	.0000	.0000
1250	.000	.000	-.000	.0000	-.0000	-.0000
1255	.000	.000	-.000	.0000	-.0000	-.0000
1260	.000	-.000	-.000	.0000	-.0000	-.0000
1265	.000	-.000	-.000	-.0000	-.0000	-.0000
1270	-.000	-.000	-.000	-.0000	-.0000	-.0000
1275	-.000	-.000	-.000	.0000	-.0000	-.0000
1285	.000	-.000	.000	.0000	-.0000	-.0000
1290	-.000	-.000	-.000	.0000	-.0000	-.0000
1295	-.000	-.000	-.000	.0000	-.0000	.0000

MODE 8 FREQUENCY 29.59

NODE POINT	D_x	D_y	D_z	θ_x	θ_y	θ_z
200	-.000	-.000	.000	.0000	-.0000	-.0000
1210	-.000	.000	.001	-.0000	.0000	-.0000
1220	-.000	.000	.001	-.0000	-.0000	.0000
1230	-.000	-.000	.001	-.0000	-.0000	-.0000
227	-.000	-.000	.001	-.0000	-.0000	-.0000
1235	.000	-.000	.000	-.0000	-.0000	-.0000
1240	-.000	-.000	.000	.0000	-.0000	.0000
1250	-.001	.000	.001	-.0000	-.0000	-.0000
1255	-.002	.000	.001	-.0000	-.0000	-.0000
1260	-.003	.000	.001	-.0000	.0000	-.0000
1265	-.003	.000	.001	-.0000	.0000	-.0000
1270	-.001	.000	.001	-.0000	.0000	-.0000
1275	-.000	.000	.000	-.0000	.0000	-.0000
1285	-.000	.000	.000	.0000	.0000	.0000
1290	-.001	-.000	-.002	-.0000	-.0000	-.0000
1295	-.000	-.000	-.000	.0000	-.0000	.0000

NOTE: 1) D_x, D_y, D_z are in inches

2) θ_x, θ_y, θ_z are in radians

RUN NO. PCGSTEY

SHOCK DIRECTION 2,4

SHOCK TYPE SSE (DBE)

SUPPORT CASE 4,2,5

MODE 10 FREQUENCY 34.87						
NODE POINT	D_x	D_y	D_z	θ_x	θ_y	θ_z
200	-.000	-.000	.000	.0000	.0000	.0000
1210	-.000	.000	.000	-.0000	.0000	-.0000
1220	-.000	-.000	.001	-.0000	-.0000	.0000
1230	-.000	-.000	.000	-.0000	-.0000	-.0000
227	-.000	-.000	.000	-.0000	-.0000	-.0000
1235	.000	-.000	.000	-.0000	-.0000	-.0000
1240	-.000	-.000	.000	.0000	-.0000	-.0000
1250	-.000	.000	.000	.0000	-.0000	-.0000
1255	-.000	.000	.000	.0000	-.0000	-.0000
1260	-.000	.000	-.000	.0000	-.0000	-.0000
1265	-.001	-.000	.000	-.0000	-.0000	-.0000
1270	-.001	.000	.000	-.0000	-.0000	-.0000
1275	-.000	.000	-.000	-.0000	-.0000	-.0000
1285	-.000	.000	.000	.0000	-.0000	-.0000
1290	.000	-.000	.001	.0000	.0000	.0000
1295	-.000	-.000	.000	.0000	.0000	.0000

MODE 11 FREQUENCY 36.44						
NODE POINT	D_x	D_y	D_z	θ_x	θ_y	θ_z
200	.000	.000	-.000	-.0000	.0000	-.0000
1210	.000	-.000	.001	-.0000	.0000	.0000
1220	.000	-.000	.001	-.0000	-.0000	-.0000
1230	.000	-.000	.001	-.0000	-.0000	.0000
227	.000	-.000	.001	-.0000	-.0000	.0000
1235	-.000	-.000	.000	-.0000	-.0000	.0000
1240	.000	-.000	.000	.0000	-.0000	-.0000
1250	-.000	.000	.001	.0000	-.0000	.0000
1255	.000	.000	.000	.0000	-.0000	.0000
1260	.001	-.000	-.000	.0000	-.0000	.0000
1265	.001	-.000	-.000	.0000	-.0000	.0000
1270	.001	.000	-.000	-.0000	-.0000	.0000
1275	.000	.000	-.000	.0000	.0000	.0000
1285	.000	.000	000	.0000	.0000	.0000
1290	.000	.000	-.000	-.0000	-.0000	-.0000
1295	.000	.000	.000	-.0000	.0000	-.0000

NOTE: 1) D_x, D_y, D_z are in inches
2) θ_x, θ_y, θ_z are in radians

RUN NO. PCGSTEY

S.O. 145

PROJECT ALA

TITLE COMPILATION OF MODE DISPLACEMENTS FOR ALA

AUTHOR S.D.H. DATE 10/21/77

CALC. NO. 14B

CHK'D. BY L.S. DATE 10/24/77

FILE NO.

GROUP RCSA

CHK'D. BY [illegible] DATE 10-21-77

PAGE 38 OF 54

REV. NO.

REV. DATE

AUTHOR DATE

CHK'D. BY DATE

CHK'D. BY DATE

WESTINGHOUSE PWR SYSTEMS DIVISION

APPENDIX B.9

OBE x,y Support Case 5-2-5

WESTINGHOUSE FORM 56213C

REV. NO. | REV. DATE | AUTHOR | DATE | CHK'D. BY | DATE | CHK'D. BY | DATE

TITLE COMPILATION OF MODE DISPLACEMENTS FOR ALA

S.O. 145 | PROJECT ALA | AUTHOR [illegible] | DATE 10/21/77 | CHK'D. BY [illegible] | DATE 10/24/77 | CHK'D. BY [illegible] | DATE 10-31-77

CALC. NO. 104 | FILE NO. 148 | GROUP RCSA

PAGE 39 of 54

SHOCK DIRECTION X,Y

SHOCK TYPE OBE

SUPPORT CASE 5,2,5

MODE 1 FREQUENCY 5.80

NODE POINT	D_x	D_y	D_z	θ_x	θ_y	θ_z
200	.000	.000	.000	.0000	.0000	-.0000
1210	-.000	.000	.000	-.0000	.0000	-.0000
1220	.000	.000	.000	-.0000	.0000	-.0000
1230	.000	.000	.000	-.0000	.0000	-.0000
227	.000	.000	.000	-.0000	.0000	-.0000
1235	.000	.000	-.000	-.0000	.0000	-.0000
1240	.000	.000	-.000	-.0000	.0000	-.0000
1250	.000	.001	.000	-.0000	.0000	-.0000
1255	.000	.001	.002	-.0000	.0000	.0000
1260	.000	.002	.005	-.0000	.0000	-.0000
1265	.001	.003	.005	-.0000	.0000	-.0000
1270	.002	.001	.006	.0001	.0000	-.0000
1275	.008	-.000	.022	.0002	.0000	-.0001
1285	.019	-.000	.055	.0002	.0000	-.0001
1290	.004	-.000	.011	.0001	.0001	-.0000
1295	.000	-.000	.000	.0000	.0000	-.0000

MODE 2 FREQUENCY 7.69

NODE POINT	D_x	D_y	D_z	θ_x	θ_y	θ_z
200	-.000	-.000	-.000	.0000	-.0000	.0000
1210	-.002	-.000	-.000	-.0000	-.0000	.0000
1220	-.004	-.001	-.000	-.0000	.0000	.0000
1230	-.002	.000	-.000	-.0000	.0000	-.0000
227	-.004	.000	-.000	-.0000	.0000	-.0000
1235	.019	.000	.000	.0000	.0000	-.0002
1240	.130	.000	.003	.0000	.0000	-.0003
1250	-.006	.001	.000	-.0000	.0000	-.0000
1255	-.007	.001	.000	-.0000	.0000	-.0000
1260	-.008	.001	-.000	-.0000	.0000	-.0000
1265	-.006	.001	-.001	.0000	.0000	-.0000
1270	-.003	.000	-.001	.0000	.0000	-.0000
1275	-.000	.000	-.001	.0000	.0000	-.0000
1285	.004	.000	-.001	-.0000	.0000	-.0000
1290	-.001	-.001	-.002	.0000	-.0000	.0000
1295	-.000	-.000	-.000	.0000	-.0000	.0000

NOTE: 1) D_x, D_y, D_z are in inches

2) θ_x, θ_y, θ_z are in radians

RUN NO. PCGS17H

WESTINGHOUSE PWR SYSTEMS DIVISION

WESTINGHOUSE PWR SYSTEMS DIVISION

TITLE COMPILATION OF MODE DISPLACEMENTS FOR ALA

S.O. 145

PROJECT ALA

AUTHOR S.D.H. DATE 10/24/77

CALC. NO.

CHK'D. BY M.S. DATE 12/27/77

FILE NO. 148

GROUP RCSA

CHK'D. BY [illegible] DATE 12-21-77

PAGE 40 OF 54

SHOCK DIRECTION X,Y

SHOCK TYPE OBE

SUPPORT CASE 5,2,5

MODE 3 FREQUENCY 9.56

NODE POINT	D_x	D_y	D_z	θ_x	θ_y	θ_z
200	-.000	.000	-.000	-.0000	-.0000	-.0000
1210	.000	-.000	-.000	-.0000	-.0000	.0000
1220	.000	-.000	-.000	-.0000	.0000	.0000
1230	.000	-.000	-.000	-.0000	.0000	.0000
227	.000	-.000	-.000	-.0000	.0000	.0000
1235	-.000	-.000	.000	.0000	.0000	.0000
1240	-.000	-.000	.011	.0000	.0000	.0000
1250	.000	.000	-.000	-.0003	.0000	.0000
1255	.000	.000	-.000	-.0000	.0000	.0000
1260	.000	.000	-.000	.0000	.0000	.0000
1265	.000	.000	-.000	.0000	.0000	.0000
1270	.000	-.000	-.000	.0000	.0000	.0000
1275	-.000	-.000	-.000	.0000	-.0000	.0000
1285	-.001	-.000	.000	.0000	-.0000	.0000
1290	-.000	.000	-.000	.0000	-.0000	-.0000
1295	-.000	.000	-.000	-.0000	-.0000	-.0000

MODE 4 FREQUENCY 9.80

NODE POINT	D_x	D_y	D_z	θ_x	θ_y	θ_z
200	.000	-.000	-.000	.0000	.0000	.0000
1210	-.000	.000	.000	-.0000	.0000	.0000
1220	-.001	-.000	.001	-.0000	-.0000	.0000
1230	-.001	-.000	.000	-.0000	-.0000	-.0000
227	-.001	-.000	.000	-.0000	-.0000	-.0000
1235	-.000	-.000	.000	.0000	-.0000	.0000
1240	-.003	-.000	.005	.0000	-.0000	.0000
1250	-.003	.001	.000	-.0000	-.0000	-.0001
1255	-.009	.001	.003	-.0001	-.0001	-.0002
1260	-.027	.001	.010	-.0001	-.0001	-.0003
1265	-.040	.003	.019	-.0001	-.0002	-.0004
1270	-.042	.004	.019	-.0001	-.0001	-.0004
1275	.005	.005	-.002	-.0002	.0000	-.0005
1285	.120	.005	-.042	-.0007	-.0000	-.0001
1290	.004	-.029	.003	.0000	.0000	.0001
1295	.001	-.001	.001	.0000	.0000	.0001

NOTE: 1) D_x, D_y, D_z are in inches
2) θ_x, θ_y, θ_z are in radians

RUN NO. PCGSTZH

WESTINGHOUSE FORM 56213C

REV. NO. | REV. DATE | AUTHOR | DATE | CHK'D. BY | DATE | CHK'D. BY | DATE

TITLE: COMPILATION OF MODE DISPLACEMENTS FOR ALA

PROJECT: ALA | S.O. 145 | AUTHOR: SPH 10/21/77 | CALC. NO. | CHK'D. BY: W.S. 10/24/77 | FILE NO. 148 | CHK'D. BY: [illegible] 10-31-77 | GROUP RCSA | PAGE 41 OF 54

SHOCK DIRECTION X,Y

SHOCK TYPE ØBE

SUPPORT CASE 5,2,5

MODE 5 FREQUENCY 15.49

NODE POINT	D_x	D_y	D_z	θ_x	θ_y	θ_z
200	-.000	.000	-.000	.0000	-.0000	-.0000
1210	-.000	.013	-.000	.0000	-.0000	-.0002
1220	.000	.033	-.000	.0000	-.0000	-.0001
1230	.001	.034	-.000	.0000	-.0000	-.0000
227	.001	.034	-.000	.0000	-.0000	-.0000
1235	.002	.040	.000	.0000	-.0000	.0000
1240	-.002	.041	.000	-.0000	-.0000	.0000
1250	-.000	.033	-.003	.0001	-.0000	-.0000
1255	-.003	.033	-.012	.0002	-.0000	-.0001
1260	-.010	.028	-.032	.0003	-.0000	-.0001
1265	-.012	.013	-.036	.0002	-.0000	-.0001
1270	-.012	.002	-.034	.0001	-.0000	-.0001
1275	-.007	.000	-.020	.0001	-.0000	-.0000
1285	.003	.000	.008	.0002	-.0000	-.0001
1290	-.005	-.000	-.012	.0001	-.0001	-.0000
1295	-.000	-.000	-.000	.0000	-.0000	-.0000

MODE 6 FREQUENCY 18.56

NODE POINT	D_x	D_y	D_z	θ_x	θ_y	θ_z
200	.000	.000	.000	-.0000	.0000	-.0000
1210	.000	.000	.000	-.0000	.0000	-.0000
1220	.001	.001	.000	-.0000	.0000	-.0000
1230	.001	.002	.000	-.0000	.0000	.0000
227	.001	.002	.000	-.0000	.0000	.0000
1235	.001	.002	-.000	-.0000	.0000	.0000
1240	-.000	.002	.000	.0000	.0000	.0000
1250	.002	.003	.002	-.0001	.0000	.0000
1255	.005	.003	.010	-.0002	.0000	.0001
1260	.009	.005	.021	-.0001	.0000	.0000
1265	.009	.005	.022	.0000	.0000	.0000
1270	.009	.002	.023	.0000	-.0000	.0000
1275	.004	.002	.014	-.0001	-.0000	.0000
1285	-.002	.002	-.009	-.0002	-.0000	.0001
1290	.004	.002	.011	-.0001	.0001	.0000
1295	.000	.000	.000	-.0000	.0000	-.0000

NOTE: 1) D_x, D_y, D_z are in inches
2) θ_x, θ_y, θ_z are in radians

RUN.NO. PCGST711

WESTINGHOUSE FORM 65213C

WESTINGHOUSE PWR SYSTEMS DIVISION

REV. NO. | REV. DATE | AUTHOR | DATE | CHK'D BY | DATE | CHK'D BY | DATE

TITLE COMPILATION OF MODE DISPLACEMENTS FOR ALA

PROJECT ALA | S.O. 145 | AUTHOR S.D.H. | CALC. NO. 1 | DATE 10/24/77 | CHK'D BY H.S. | FILE NO. 148 | DATE 10/24/77 | GROUP RCSA | CHK'D BY [illegible] | DATE 10-31-77 | PAGE 42 OF 54

SHOCK DIRECTION X,Y

SHOCK TYPE OBE

SUPPORT CASE 5,2,5

MODE 7 FREQUENCY 19.17						
NODE POINT	D_x	D_y	D_z	θ_x	θ_y	θ_z
200	.000	-.000	-.000	.0000	-.0000	.0000
1210	.001	-.003	-.000	.0000	-.0000	.0000
1220	.003	-.004	-.000	.0000	-.0000	-.0000
1230	.007	-.001	-.000	.0000	-.0000	-.0000
227	.004	-.001	-.000	.0000	-.0000	-.0000
1235	.013	-.001	.000	.0000	-.0000	.0000
1240	-.009	-.001	.000	-.0000	-.0000	.0001
1250	.004	-.000	-.000	.0000	-.0000	-.0000
1255	.002	-.000	-.001	.0000	-.0000	-.0000
1260	.000	-.000	-.003	.0000	-.0000	-.0000
1265	-.001	-.001	-.003	-.0000	-.0000	-.0000
1270	-.001	-.000	-.003	-.0000	-.0000	-.0000
1275	-.001	-.000	-.002	.0000	-.0000	-.0000
1285	.000	-.000	.001	.0000	-.0000	-.0000
1290	-.000	-.000	-.001	.0000	-.0000	-.0000
1295	-.000	-.000	-.000	.0000	-.0000	.0000

MODE 8 FREQUENCY 30.58						
NODE POINT	D_x	D_y	D_z	θ_x	θ_y	θ_z
200	-.000	.000	-.000	-.0000	-.0000	-.0000
1210	-.000	.000	.000	-.0000	.0000	-.0000
1220	-.000	.000	.000	-.0000	-.0000	.0000
1230	-.000	-.000	.000	-.0000	-.0000	-.0000
227	-.000	-.000	.000	-.0000	-.0000	-.0000
1235	.000	-.000	-.000	-.0000	-.0000	-.0000
1240	-.000	-.000	.000	.0000	-.0000	.0000
1250	-.000	.000	.000	-.0000	-.0000	-.0000
1255	-.001	.000	.000	-.0000	.0000	-.0000
1260	-.001	.000	.000	-.0000	.0000	-.0000
1265	-.001	.000	.000	-.0000	.0000	-.0000
1270	-.000	.000	.000	-.0000	.0000	-.0000
1275	-.000	.000	.000	-.0000	.0000	-.0000
1285	-.000	.000	.000	.0000	.0000	.0000
1290	-.000	.000	-.001	-.0000	-.0000	-.0000
1295	-.000	.000	-.000	-.0000	-.0000	-.0000

NOTE: 1) D_x, D_y, D_z are in inches

2) θ_x, θ_y, θ_z are in radians

RUN NO. PCGST7H

APPENDIX B.10

OBE y,z Support Case 5-2-5

WESTINGHOUSE FORM 92213C

WESTINGHOUSE PWR SYSTEMS DIVISION

TITLE: COMPILATION OF MODE DISPLACEMENTS FOR ALA

PROJECT: ALA | S.O. 145 | PAGE 43 OF 54

AUTHOR: S.D.H. DATE: 10/24/77 | CALC. NO.

CHK'D. BY: W.S. DATE: 10/27/77 | FILE NO. 14B

CHK'D. BY: [illegible] DATE: 10-31-77 | GROUP RCSA

REV. NO. | REV. DATE | AUTHOR | DATE | CHK'D. BY | DATE | CHK'D. BY | DATE

SHOCK DIRECTION 2,4

SHOCK TYPE ΦBE

SUPPORT CASE 5,2,5

MODE 1 FREQUENCY 5.80						
NODE POINT	D_x	D_y	D_z	θ_x	θ_y	θ_z
200	.000	.000	.000	.0000	.0000	-.0000
1210	-.000	.000	.000	-.0000	.000	-.0000
1220	.000	.001	.000	-.0001	.0000	-.0000
1230	.000	.001	.000	-.0000	.0000	-.0000
227	.000	.001	.000	-.0000	.0000	-.0000
1235	.000	.001	-.000	-.0000	.0000	-.0000
1240	.000	.001	-.000	-.0000	.0000	-.0000
1250	.000	.002	.001	-.0000	.0000	-.0000
1255	.000	.003	.004	-.0001	.0000	.0000
1260	.001	.004	.014	-.0001	.0000	-.0000
1265	.002	.003	.014	-.0000	.0000	-.0000
1270	.006	.004	.018	.0003	.0001	-.0001
1275	.023	-.001	.065	.0004	.0001	-.0002
1285	.058	-.001	.164	.0004	.0001	-.0002
1290	.012	-.001	.033	.0003	.0001	-.0001
1295	.001	-.000	.001	.0000	.0001	-.0000

MODE 3 FREQUENCY 9.56						
NODE POINT	D_x	D_y	D_z	θ_x	θ_y	θ_z
200	-.000	.000	-.000	-.0000	-.0000	-.0000
1210	.000	-.000	-.002	-.0000	-.0000	.0000
1220	.000	-.000	-.004	-.0000	.0000	.0000
1230	.000	-.000	-.004	-.0000	.0000	.0000
227	.000	-.000	-.003	-.0000	.0000	.0000
1235	-.001	-.000	.002	.0002	.0000	.0000
1240	-.003	-.000	.170	.0004	.0000	.0000
1250	.001	.000	-.003	-.0000	.0000	.0000
1255	.002	.000	-.003	-.0000	.0000	.0000
1260	.003	.000	-.003	.0000	.0000	.0000
1265	.003	.000	-.003	.0000	.0000	.0000
1270	.003	-.000	-.003	.0000	.0004	.0000
1275	-.001	-.000	-.001	.0000	-.0000	.0000
1285	-.009	-.000	.004	.0000	-.0000	.0000
1290	-.000	.002	-.000	.0000	-.0000	-.0000
1295	-.000	.000	-.000	-.0000	-.0000	-.0000

NOTE: 1) D_x, D_y, D_z are in inches
2) θ_x, θ_y, θ_z are in radians

RUN NO. PCGSTAV

WESTINGHOUSE PWR SYSTEMS DIVISION

WESTINGHOUSE FORM 55213C

REV. NO. | REV. DATE | AUTHOR | DATE | CHK'D BY | DATE | CHK'D BY | DATE

TITLE COMPILATION OF MODE DISPLACEMENTS FOR ALA

PROJECT ALA. | S.O. 145 | AUTHOR | DATE | CHK'D BY | DATE | PAGE 44 OF 54

CALC. NO. | FILE NO. 145 | GROUP RCSA | CHK'D BY | DATE

SHOCK DIRECTION 2,4

SHOCK TYPE OBE

SUPPORT CASE 5,2,5

MODE 4 FREQUENCY 9.80

NODE POINT	D_x	D_y	D_z	θ_x	θ_y	θ_z
200	.000	-.000	-.000	.0000	.0000	.0000
1210	-.000	.000	.000	-.0000	.0000	.0000
1220	-.000	-.000	.000	-.0000	-.0000	.0000
1230	-.000	-.000	.000	-.0000	-.0000	-.0000
227	-.000	-.000	.000	-.0000	-.0000	-.0000
1235	-.000	-.000	.000	.0000	-.0000	.0000
1240	-.001	-.000	.002	.0000	-.0000	.0000
1250	-.001	.000	.000	-.0000	-.0000	-.0000
1255	-.003	.000	.001	-.0000	-.0000	-.0001
1260	-.008	.000	.003	-.0000	-.0000	-.0001
1265	-.019	.001	.005	-.0000	-.0001	-.0001
1270	-.019	.001	.005	-.0000	-.0000	-.0001
1275	.002	.002	.001	-.0001	-.0000	-.0002
1205	.040	.002	-.019	-.0001	-.0000	-.0002
1290	.002	-.018	.001	.0000	.0000	.0000
1295	.000	-.000	.000	.0000	.0000	.0000

MODE 5 FREQUENCY 15.99

NODE POINT	D_x	D_y	D_z	θ_x	θ_y	θ_z
200	-.000	.000	-.000	.0000	-.0000	-.0000
1210	-.000	.016	-.000	.0000	-.0000	-.0002
1220	.000	.039	-.001	.0000	-.0000	-.0001
1230	.002	.041	-.000	.0000	-.0000	-.0000
227	.001	.040	-.000	.0000	-.0000	-.0000
1235	.002	.048	.000	.0000	-.0000	.0000
1240	-.002	.049	.000	-.0000	-.0000	.0000
1250	-.000	.040	-.003	.0001	-.0000	-.0000
1255	-.004	.039	-.014	.0003	-.0000	-.0001
1260	-.012	.039	-.038	.0004	-.0000	-.0001
1265	-.019	.016	-.043	.0003	-.0000	-.0001
1270	-.019	.003	-.040	.0002	-.0000	-.0001
1275	-.009	.000	-.024	.0002	-.0000	-.0001
1205	.004	.000	.004	.0002	-.0000	-.0001
1290	-.005	-.000	-.015	.0001	-.0001	-.0000
1295	-.000	-.000	-.000	.0000	-.0000	-.0000

NOTE: 1) D_x, D_y, D_z are in inches

2) θ_x, θ_y, θ_z are in radians

RUN NO. PCGSTAV

WESTINGHOUSE PWR SYSTEMS DIVISION

TITLE COMPILATION OF MODE DISPLACEMENTS FOR ALA

PROJECT ALA | S.O. 145 | PAGE 45 OF 54

AUTHOR S.D.H. | CALC. NO. | DATE 10/21/77

CHK'D. BY S.S. 10/24/77 | FILE NO. 148 | DATE

CHK'D. BY | GROUP RCSA | DATE

REV. NO. | BY | DATE

REV. NO. | BY | DATE

REV. NO. | BY | DATE

WESTINGHOUSE FORM 5521C

SHOCK DIRECTION Z,Y

SHOCK TYPE ΦBE

SUPPORT CASE 5,2,5

MODE 6 FREQUENCY 18.56							MODE 7 FREQUENCY 19.17						
NODE POINT	D_x	D_y	D_z	θ_x	θ_y	θ_z	NODE POINT	D_x	D_y	D_z	θ_x	θ_y	θ_z
200	.000	.000	.000	-.0000	.0000	-.0000	200	.000	-.000	-.000	.0000	-.0000	.0000
1210	.000	.000	.000	-.0000	.0000	-.0000	1210	.000	-.000	-.000	.0000	-.0000	.0000
1220	.001	.002	.000	-.0000	.0000	-.0000	1220	.000	-.000	-.000	.0000	-.0000	-.0000
1230	.001	.002	.000	-.0000	.0000	.0000	1230	.001	-.000	-.000	.0000	-.0000	-.0000
227	.001	.002	.000	-.0000	.0000	.0000	227	.001	-.000	-.000	.0000	-.0000	-.0000
1235	.001	.002	-.000	-.0000	.0000	.0000	1235	.002	-.000	.000	.0000	-.0000	.0000
1240	-.000	.002	.000	.0000	.0000	.0000	1240	-.001	-.000	.000	-.0000	-.0000	.0000
1250	.002	.003	.002	-.0001	.0000	.0000	1250	.000	-.000	-.000	.0000	-.0000	-.0000
1255	.005	.003	.010	-.0002	.0000	.0001	1255	.000	-.000	-.000	.0000	-.0000	-.0000
1260	.009	.004	.023	-.0001	.0000	.0000	1260	.000	-.000	-.000	.0000	-.0000	-.0000
1265	.010	.005	.024	.0000	.0000	.0000	1265	-.000	-.000	-.000	-.0000	-.0000	-.0000
1270	.010	.007	.025	.0000	-.0000	.0000	1270	-.000	-.000	-.000	-.0000	-.0000	-.0000
1275	.006	.007	.018	-.0001	-.0000	.0000	1275	-.000	-.000	-.000	.0000	-.0000	-.0000
1285	-.003	.007	-.010	-.0002	-.0000	.0001	1285	.000	-.000	.000	.0000	-.0000	-.0000
1290	.005	.007	.012	-.0001	.0001	.0000	1290	-.000	-.000	-.000	.0000	-.0000	-.0000
1295	.000	.000	.000	-.0000	.0000	-.0000	1295	-.000	-.000	-.000	.0000	-.0000	.0000

NOTE: 1) D_x, D_y, D_z are in inches

2) θ_x, θ_y, θ_z are in radians

RUN NO. PCGSTAY

APPENDIX B.11

SSE (DBE) x,y Support Case 5-2-5

WESTINGHOUSE PWR SYSTEMS DIVISION

TITLE: COMPILATION OF MODE DISPLACEMENTS FOR ALA

PROJECT: ALA | S.O. 145 | PAGE 46 OF 54

AUTHOR: S.D.H. DATE: 10/21/77 | CALC. NO. | CHK'D. BY: [illegible] DATE: 10-21-77

FILE NO. 148 | GROUP RCSA

SHOCK DIRECTION X,Y

SHOCK TYPE SSE (DBE)

SUPPORT CASE 5,7,5

MODE 1 FREQUENCY 5.80

NODE POINT	D_x	D_y	D_z	θ_x	θ_y	θ_z
200	.000	.000	.000	.0000	.0000	-.0000
1210	-.000	.000	.000	-.0000	.0000	-.0000
1220	.000	.001	.000	-.0000	.0000	-.0000
1230	.000	.001	.000	-.0000	.0000	-.0000
227	.000	.001	.000	-.0000	.0000	-.0000
1235	.000	.001	-.000	-.0000	.0000	-.0000
1240	.000	.001	-.000	-.0000	.0000	-.0000
1250	.000	.001	.001	-.0000	.0000	-.0000
1255	.000	.001	.003	-.0001	.0000	.0000
1260	.000	.002	.007	-.0001	.0000	-.0000
1265	.001	.004	.008	-.0000	.0000	-.0000
1270	.003	.002	.009	.0001	.0000	-.0000
1275	.011	-.000	.031	.0002	.0000	-.0001
1285	.020	-.000	.060	.0003	.0000	-.0001
1290	.004	-.001	.014	.0051	.0012	-.0000
1295	.001	-.000	.000	.0000	.0000	-.0000

MODE 2 FREQUENCY 7.69

NODE POINT	D_x	D_y	D_z	θ_x	θ_y	θ_z
200	-.000	-.000	-.000	.0000	-.0000	.0000
1210	-.002	-.000	-.000	-.0000	-.0000	.0000
1220	-.005	-.002	-.000	-.0000	.0000	.0000
1230	-.003	.000	-.000	-.0000	.0000	-.0001
227	-.005	.000	-.000	-.0000	.0000	-.0001
1235	.026	.000	.000	.0000	.0000	-.0002
1240	.185	.000	.004	.0000	.0000	-.0004
1250	-.008	.001	.008	-.0000	.0000	.0001
1255	-.010	.001	.000	-.0000	.0000	-.0000
1260	-.011	.001	-.000	-.0000	.0001	-.0000
1265	-.008	.001	-.001	.0000	.0001	-.0000
1270	-.005	.000	-.002	.0000	.0000	-.0000
1275	-.001	.000	-.002	.0000	.0000	-.0000
1285	.006	.000	-.002	-.0000	.0000	-.0000
1290	-.001	-.002	-.002	.0000	-.0000	.0000
1295	-.000	-.000	-.000	.0000	-.0000	.0000

NOTE: 1) D_x, D_y, D_z are in inches
2) θ_x, θ_y, θ_z are in radians

RUN NO. PCGST9C

WESTINGHOUSE FORM 22713C

REV. NO. | REV. DATE | AUTHOR | DATE | CHK'D. BY | DATE

WESTINGHOUSE FORM 56212C

REV. NO. | REV. DATE | AUTHOR | DATE | CHK'D. BY | DATE | CHK'D. BY | DATE

SHOCK DIRECTION X,Y
SHOCK TYPE SSE (DBE)
SUPPORT CASE 5,2,5

S.O. 145	TITLE COMPILATION OF MODE DISPLACEMENTS FOR ALA	PAGE 47 OF 54
	PROJECT ALA	
CALC. NO.	AUTHOR S.D.A. 10/24/77	CHK'D. BY 10/24/77
FILE NO. 143		
GROUP RCSA		CHK'D. BY 10-24-77

MODE 3 FREQUENCY 9.56

NODE POINT	D_x	D_y	D_z	θ_x	θ_y	θ_z
200	-.000	.000	-.000	-.0000	-.0000	-.0000
1210	.000	-.000	-.000	-.0000	-.0000	.0000
1220	.000	-.000	-.000	-.0000	.0000	.0000
1230	.000	-.000	-.000	-.0000	.0000	.0000
227	.000	-.000	-.000	-.0000	.0000	.0000
1235	-.000	-.000	.000	.0000	.0000	.0000
1240	-.000	-.000	.000	.0000	.0000	.0000
1250	.000	.000	-.000	-.0000	.0000	.0000
1255	.000	.000	-.000	-.0000	.0000	.0000
1260	.000	.000	-.000	.0000	.0000	.0000
1265	.000	.000	-.000	.0000	.0000	.0000
1270	.000	-.000	-.000	.0000	.0000	.0000
1275	-.000	-.000	-.000	.0000	-.0000	.0000
1280	-.000	-.000	.000	.0000	-.0000	.0000
1290	-.000	.000	-.000	.0000	-.0000	-.0000
1295	-.000	.000	-.000	-.0000	-.0000	-.0000

MODE 4 FREQUENCY 9.80

NODE POINT	D_x	D_y	D_z	θ_x	θ_y	θ_z
200	.000	-.000	-.000	.0000	.0000	.0000
1210	-.000	.000	.000	-.0000	.0000	.0000
1220	-.000	-.000	.001	-.0000	-.0000	.0000
1230	-.000	-.000	.000	-.0000	-.0000	-.0000
227	-.000	-.000	.000	-.0000	-.0000	-.0000
1235	-.000	-.000	.000	.0000	-.0000	.0000
1240	-.002	-.000	.004	.0000	-.0000	.0000
1250	-.002	.000	.000	-.0000	-.0000	-.0001
1255	-.001	.001	.002	-.0001	-.0000	-.0001
1260	-.020	.001	.008	-.0001	-.0001	-.0002
1265	-.030	.002	.010	-.0001	-.0001	-.0003
1270	-.031	.003	.010	-.0001	-.0001	-.0003
1275	.004	.004	-.002	-.0001	-.0000	-.0003
1285	.089	.004	-.031	-.0002	-.0000	-.0005
1290	.003	-.022	.002	.0000	.0000	.0001
1295	.001	-.001	.001	.0000	.0000	.0000

NOTE: 1) D_x, D_y, D_z are in inches
2) θ_x, θ_y, θ_z are in radians

RUN NO. PCGST9C

WESTINGHOUSE PWR SYSTEMS DIVISION

WESTINGHOUSE FORM 66213C

REV. NO. | REV. DATE | AUTHOR | CHK'D. BY | DATE | CHK'D. BY | DATE

TITLE COMPILATION OF MODE DISPLACEMENTS FOR ALA

PROJECT ALA | AUTHOR SDA 10/21/77 | CHK'D. BY K.S. 10/24/77 | CHK'D. BY [illegible] 10-21-77

S.O. 145 | CALC. NO. | FILE NO. 143 | GROUP RCSA

PAGE 48 OF 54

SHOCK DIRECTION X,Y

SHOCK TYPE SSE (DBE)

SUPPORT CASE 5,2,5

MODE 5 FREQUENCY 15.99

NODE POINT	D_x	D_y	D_z	θ_x	θ_y	θ_z
200	-.000	.000	-.000	.0000	-.0000	-.0000
1210	-.000	.011	-.000	.0000	-.0000	-.0002
1220	.000	.028	-.000	.0000	-.0000	-.0001
1230	.001	.029	-.000	.0000	-.0000	-.0000
227	.001	.029	-.000	.0000	-.0000	-.0000
1235	.001	.030	.000	.0000	-.0000	.0000
1240	-.001	.035	.000	-.0000	-.0000	.0000
1250	-.000	.028	-.002	.0001	-.0000	-.0000
1255	-.003	.028	-.010	.0002	-.0000	-.0001
1260	-.008	.029	-.027	.0003	-.0000	-.0001
1265	-.018	.031	-.031	.0002	-.0000	-.0001
1270	-.018	.002	-.029	.0001	-.0000	-.0000
1275	-.006	.000	-.011	.0001	-.0000	-.0000
1285	.003	.000	.001	.0001	-.0000	-.0001
1290	-.004	-.000	.011	.0001	-.0001	-.0000
1295	-.000	-.000	-.000	.0000	-.0000	-.0000

MODE 6 FREQUENCY 18.56

NODE POINT	D_x	D_y	D_z	θ_x	θ_y	θ_z
200	.000	.000	.000	-.0000	.0000	-.0000
1210	.000	.000	.000	-.0000	.0000	-.0000
1220	.001	.001	.000	-.0000	.0000	-.0000
1230	.001	.002	.000	-.0000	.0000	.0000
227	.001	.002	.000	-.0000	.0000	.0000
1235	.001	.002	-.000	-.0000	.0000	.0000
1240	-.000	.002	.000	.0000	.0000	.0000
1250	.002	.003	.002	-.0001	.0000	.0000
1255	.005	.003	.009	-.0002	.0000	.0001
1260	.009	.005	.021	-.0001	.0000	.0000
1265	.009	.005	.022	.0000	.0000	.0000
1270	.009	.002	.023	.0000	-.0000	.0000
1275	.006	.002	.016	-.0001	-.0000	.0000
1285	-.003	.002	-.009	-.0002	-.0000	.0001
1290	.004	.002	.011	-.0001	.0001	.0000
1295	.000	.000	.000	-.0000	.0000	-.0000

NOTE: 1) D_x, D_y, D_z are in inches

2) θ_x, θ_y, θ_z are in radians

RUN NO. PC6ST9C

WESTINGHOUSE PWR SYSTEMS DIVISION

SHOCK DIRECTION X,Y

SHOCK TYPE SSE (DBE)

SUPPORT CASE 5,2,5

MODE 7 FREQUENCY 19.11						
NODE POINT	D_x	D_y	D_z	θ_x	θ_y	θ_z
200	.000	-.000	-.000	.0000	-.0000	.0000
1210	.001	-.003	-.000	.0000	-.0000	.0000
1220	.003	-.004	-.000	.0000	-.0000	-.0000
1230	.007	-.001	-.000	.0000	-.0000	-.0000
227	.006	-.001	-.000	.0000	-.0000	-.0000
1235	.015	-.001	.000	.0000	-.0000	.0000
1240	-.018	-.001	.000	-.0000	-.0000	.0001
1250	.004	-.000	-.000	.0000	-.0000	-.0000
1255	.003	-.000	-.001	.0000	-.0000	-.0000
1260	.000	-.000	-.003	.0000	-.0000	-.0000
1265	-.001	-.001	-.003	-.0000	-.0000	-.0000
1270	-.001	-.000	-.003	-.0000	-.0000	-.0000
1275	-.001	-.000	-.002	.0000	-.0000	-.0000
1285	.000	-.000	.001	.0000	-.0000	-.0000
1290	-.000	-.000	-.001	.0000	-.0000	-.0000
1295	-.000	-.000	-.000	.0000	-.0000	.0000

MODE 8 FREQUENCY 30.58						
NODE POINT	D_x	D_y	D_z	θ_x	θ_y	θ_z
200	-.000	.000	-.000	-.0000	-.0000	-.0000
1210	-.000	.000	.000	-.0000	.0000	-.0000
1220	-.000	.000	.000	-.0000	-.0000	.0000
1230	-.000	-.000	.000	-.0000	-.0000	-.0000
227	-.000	-.000	.000	-.0000	-.0000	-.0000
1235	.000	-.000	-.000	-.0000	-.0000	-.0000
1240	-.000	-.000	.000	.0000	-.0000	.0000
1250	-.001	.000	.000	-.0000	-.0000	-.0000
1255	-.002	.000	.000	-.0000	.0000	-.0000
1260	-.003	.000	.001	-.0000	.0000	-.0000
1265	-.003	.001	.001	-.0000	.0000	-.0000
1270	-.001	.001	.001	-.0000	.0000	-.0000
1275	-.000	.001	.000	-.0000	.0000	-.0000
1285	-.000	.001	.000	.0000	.0000	.0000
1290	-.001	.001	-.002	-.0000	-.0000	-.0000
1295	-.000	.000	-.000	-.0000	-.0000	-.0000

NOTE: 1) D_x, D_y, D_z are in inches

2) θ_x, θ_y, θ_z are in radians

RUN NO. PC45T9C

TITLE COMPILATION OF MODE DISPLACEMENTS FOR ALA

PROJECT ALA

S.O. 145

AUTHOR SDH DATE 10/21/77

CALC. NO.

CHK'D BY W.S. Gallo DATE 10-21-77

FILE NO. 148

GROUP RCSA

PAGE 49 OF 54

DATE

WESTINGHOUSE PWR SYSTEMS DIVISION

WESTINGHOUSE FORM 55213C

REV. NO. | REV. DATE | AUTHOR | DATE | CHK'D BY | DATE | CHK'D BY | DATE

TITLE COMPILATION OF MODE DISPLACEMENTS FOR ALA

PROJECT ALA | AUTHOR SDH | DATE 10/31/77 | CHK'D BY RS | DATE 10/24/77 | CHK'D BY | DATE

S.O. 145 | CALC. NO. 2 | FILE NO. 148 | GROUP RCSA

SHOCK DIRECTION X,Y

SHOCK TYPE SSE (DBE)

SUPPORT CASE 5,2,5

MODE 9 FREQUENCY 31.77

NODE POINT	D_x	D_y	D_z	θ_x	θ_y	θ_z
200	.000	.000	.000	-.0000	.0000	-.0000
1210	.000	-.000	-.000	.0000	-.0000	.0000
1220	.000	-.000	-.000	.0000	.0000	-.0000
1230	.000	-.000	-.000	.0000	.0000	.0000
227	.000	-.000	-.000	.0000	.0000	.0000
1235	-.000	-.000	.000	.0000	.0000	.0000
1240	.000	-.000	-.000	-.0000	.0000	-.0000
1250	.000	-.000	-.000	.0000	-.0000	.0000
1255	.001	-.000	-.000	.0000	-.0000	.0000
1260	.001	-.000	-.001	-.0000	-.0000	.0000
1265	.001	.000	-.000	-.0000	-.0000	.0000
1270	.000	.001	-.000	-.0000	-.0000	.0000
1275	.000	.001	-.000	.0000	-.0000	.0000
1285	.000	.001	.000	.0000	-.0000	-.0000
1290	.000	.001	.001	-.0000	.0000	-.0000
1295	.000	.000	.000	-.0000	.0000	-.0000

MODE 10 FREQUENCY 35.93

NODE POINT	D_x	D_y	D_z	θ_x	θ_y	θ_z
200	-.000	-.000	.000	.0000	-.0000	.0000
1210	-.000	.000	.000	-.0000	.0000	-.0000
1220	-.000	.000	.000	-.0000	-.0000	.0000
1230	-.000	-.000	.000	-.0000	-.0000	-.0000
227	-.000	-.000	.000	-.0000	-.0000	-.0000
1235	.000	-.000	-.000	-.0000	-.0000	-.0000
1240	-.000	-.000	.000	.0000	-.0000	.0000
1250	-.000	.000	.000	-.0000	-.0000	-.0000
1255	-.001	.000	.000	-.0000	-.0000	-.0000
1260	-.001	.000	.000	-.0000	-.0000	-.0000
1265	-.002	.000	.000	-.0000	-.0000	-.0000
1270	-.002	.000	.000	-.0000	-.0000	-.0000
1275	-.001	.000	.000	-.0000	-.0000	-.0000
1285	-.000	.000	.000	0000	-.0000	-.0000
1290	.000	-.001	.001	.0000	.0000	.0000
1295	-.000	-.000	-.000	.0000	.0000	.0000

NOTE: 1) D_x, D_y, D_z are in inches
2) θ_x, θ_y, θ_z are in radians

RUN NO. PCGST9C

APPENDIX B.12

SSE (DBE) y,z Support Case 5-2-5

WESTINGHOUSE PWR SYSTEMS DIVISION

WESTINGHOUSE FORM 50213C

REV. NO. | REV. DATE

TITLE: COMPILATION OF MODE DISPLACEMENTS FOR ALA

PROJECT: ALA | S.O. 145 | PAGE 51 OF 54

AUTHOR: S.P.H. 10/21/77 | CALC. NO. | DATE

CHK'D BY: W.S. 10/24/77 | FILE NO. 143 | DATE

CHK'D BY: [illegible] 10-24-77 | GROUP RCSA | DATE

SHOCK DIRECTION 2,4

SHOCK TYPE SSE (DBE)

SUPPORT CASE 5,2,5

MODE 1 FREQUENCY 5.80

NODE POINT	D_x	D_y	D_z	θ_x	θ_y	θ_z
200	.000	.000	.000	.0000	.0000	-.0000
1210	-.000	.001	.000	-.0000	.0000	-.0000
1220	.000	.002	.001	-.0000	.0000	-.0000
1230	.000	.002	.000	-.0000	.0000	-.0000
227	.000	.002	.000	-.0000	.0000	-.0000
1235	.000	.002	-.000	-.0000	.0000	-.0000
1240	.000	.002	-.000	-.0000	.0000	-.0000
1250	.000	.003	.002	-.0001	.0000	-.0000
1255	.000	.004	.004	-.0001	.0000	.0000
1260	.001	.007	.013	-.0002	.0000	-.0000
1265	.003	.013	.027	-.0003	.0001	-.0000
1270	.008	.006	.025	.0004	.0001	-.0001
1275	.033	-.001	.092	.0001	.0001	-.0002
1285	.002	-.001	.235	.0008	.0001	-.0003
1290	.017	-.003	.047	.0004	.0004	-.0001
1295	.002	-.004	.001	.0000	.0001	-.0000

MODE 2 FREQUENCY 7.69

NODE POINT	D_x	D_y	D_z	θ_x	θ_y	θ_z
200	-.000	-.000	-.000	.0000	-.0000	.0000
1210	-.000	-.000	-.000	-.0000	-.0000	.0000
1220	-.000	-.000	-.000	-.0000	.0000	.0000
1230	-.000	.000	-.000	-.0000	.0000	-.0000
227	-.000	.000	-.000	-.0000	.0000	-.0000
1235	.000	.000	.000	.0000	.0000	-.0000
1240	.001	.000	.000	.0000	.0000	-.0000
1250	-.000	.000	.000	-.0000	.0000	-.0000
1255	-.000	.000	.000	-.0000	.0000	-.0000
1260	-.000	.000	-.000	-.0000	.0000	-.0000
1265	-.000	.000	-.000	.0000	.0000	-.0000
1270	-.000	.000	-.000	.0000	.0000	-.0000
1275	-.000	.000	-.000	.0000	.0000	-.0000
1285	.000	.000	-.000	-.0000	.0000	-.0000
1290	-.000	-.000	-.000	.0000	-.0000	.0000
1295	-.000	-.000	-.000	.0000	-.0000	.0000

NOTE: 1) D_x, D_y, D_z are in inches
2) θ_x, θ_y, θ_z are in radians

RUN NO. PCGSTEY

WESTINGHOUSE PWR SYSTEMS DIVISION

WESTINGHOUSE FORM 6921C

TITLE COMPILATION OF MODE DISPLACEMENTS FOR ALA

PROJECT ALA

S.O. 145

AUTHOR S.O.H. DATE 10/24/77

CHK'D. BY W.S. DATE 10/24/77

FILE NO. 148

GROUP RCSA

CHK'D. BY [illegible] DATE 11-21-77

PAGE 52 OF 54

SHOCK DIRECTION 2,4

SHOCK TYPE SSE (DBE)

SUPPORT CASE 5,2,5

MODE 3 FREQUENCY 9.56

NODE POINT	D_x	D_y	D_z	θ_x	θ_y	θ_z
200	-.000	.000	-.000	-.0000	-.0000	-.0000
1210	.000	-.000	-.001	-.0000	-.0000	.0000
1220	.000	-.000	-.003	-.0000	.0000	.0000
1230	.000	-.000	-.003	-.0000	.0000	.0000
227	.000	-.000	-.002	-.0000	.0000	.0000
1235	-.000	-.000	.002	.0002	.0000	.0000
1240	-.003	-.000	.133	.0003	.0000	.0000
1250	.001	.000	-.002	-.0000	.0000	.0000
1255	.001	.000	-.002	-.0000	.0000	.0000
1260	.002	.000	-.002	.0000	.0000	.0000
1265	.002	.000	-.002	.0000	.0000	.0000
1270	.002	-.000	-.002	.0000	.0000	.0000
1275	-.000	-.000	-.001	.0000	-.0000	.0000
1280	-.001	-.000	.003	.0000	-.0000	.0000
1285	-.000	.002	-.000	.0000	-.0000	-.0000
1290	-.000	.000	-.000	-.0000	-.0000	-.0000
1295						

MODE 4 FREQUENCY 9.80

NODE POINT	D_x	D_y	D_z	θ_x	θ_y	θ_z
200	.000	-.000	-.000	.0000	.0000	.0000
1210	-.000	.000	.000	-.0000	.0000	.0000
1220	-.000	-.000	.000	-.0000	-.0000	.0000
1230	-.000	-.000	.000	-.0000	-.0000	-.0000
227	-.000	-.000	.000	-.0000	-.0000	-.0000
1235	-.000	-.000	.000	.0000	-.0000	.0000
1240	-.001	-.000	.001	.0000	-.0000	.0000
1250	-.001	.000	.000	-.0000	-.0000	-.0000
1255	-.002	.000	.001	-.0000	-.0000	-.0000
1260	-.002	.000	.003	-.0000	-.0000	-.0001
1265	-.011	.001	.004	-.0000	-.0000	-.0001
1270	-.011	.001	.004	-.0000	-.0000	-.0001
1275	.001	.001	-.001	-.0000	-.0000	-.0001
1285	.013	.001	-.011	-.0001	-.0000	-.0002
1290	.001	-.000	.001	.0000	.0000	.0000
1295	.000	-.000	.000	.0000	.0000	.0000

NOTE: 1) D_x, D_y, D_z are in inches

2) θ_x, θ_y, θ_z are in radians

RUN NO. PCGSTEY

WESTINGHOUSE PWR SYSTEMS DIVISION

TITLE: COMPILATION OF MODE DISPLACEMENTS FOR ALA

PROJECT: ALA | S.O. 145 | AUTHOR: S.M. | CALC. NO. | DATE: 10/21/77 | CHK'D. BY: W.S. 12/24/77 | FILE NO. 148 | GROUP RCSA | DATE | CHK'D. BY | DATE | PAGE 53 OF 54

REV. NO. | REV. DATE | AUTHOR | DATE | CHK'D. BY | DATE | CHK'D. BY | DATE

WESTINGHOUSE FORM 6621-3C

SHOCK DIRECTION 2,4

SHOCK TYPE SSE (DBE)

SUPPORT CASE 5,2,5

MODE 5 FREQUENCY 19.99

NODE POINT	D_x	D_y	D_z	θ_x	θ_y	θ_z
200	-.000	.000	-.000	.0000	-.0000	-.0000
1210	-.000	.013	-.000	.0000	-.0000	-.0007
1220	.000	.033	-.000	.0000	-.0000	-.0001
1230	.001	.035	-.000	.0000	-.0000	-.0000
1235	.001	.035	-.000	.0000	-.0000	-.0000
1240	.002	.041	.000	.0000	-.0000	.0000
1250	-.002	.042	.000	-.0000	-.0000	.0000
1255	-.000	.039	-.003	.0001	-.0000	-.0000
1260	-.003	.034	-.012	.0002	-.0000	-.0001
1265	-.010	.029	-.023	.0003	-.0000	-.0001
1270	-.017	.013	-.037	.0002	-.0000	-.0001
1275	-.017	.009	-.039	.0002	-.0000	-.0001
1285	-.007	.006	-.021	.0001	-.0000	-.0000
1290	.003	.000	-.006	.0002	-.0000	-.0001
1295	-.005	-.006	-.019	.0001	-.0001	-.0000
	-.000	-.000	-.000	.0000	-.0000	-.0000

MODE 6 FREQUENCY 18.96

NODE POINT	D_x	D_y	D_z	θ_x	θ_y	θ_z
200	.000	.000	.000	-.0000	.0000	-.0000
1210	.000	.000	.000	-.0000	.0000	-.0000
1220	.001	.002	.000	-.0000	.0000	-.0000
1230	.001	.002	.000	-.0000	.0000	.0000
227	.001	.002	.000	-.0000	.0000	.0000
1235	.001	.003	-.000	-.0000	.0000	.0000
1240	-.000	.003	.000	.0000	.0000	.0000
1250	.003	.003	.003	-.0001	.0000	.0000
1255	.005	.003	.011	-.0002	.0000	.0001
1260	.010	.005	.025	-.0001	.0000	.0000
1265	.011	.004	.026	.0000	.0000	.0000
1270	.011	.002	.027	.0000	-.0000	.0000
1275	.007	.002	.019	-.0001	-.0000	.0000
1285	-.004	.002	.011	-.0002	-.0000	.0001
1290	.005	.002	.013	-.0001	.0001	.0000
1295	.000	.000	.000	-.0000	.0000	-.0000

NOTE: 1) D_x, D_y, D_z are in inches

2) θ_x, θ_y, θ_z are in radians

RUN NO. PCGSTEY

WESTINGHOUSE PWR SYSTEMS DIVISION

WESTINGHOUSE FORM 56213C

REV. NO.	REV. DATE	AUTHOR	DATE	CHK'D. BY	DATE	CHK'D. BY	DATE

TITLE: COMPILATION OF MODE DISPLACEMENTS FOR ALA

PROJECT: ALA | AUTHOR: SDH | DATE: 10/24/77 | CHK'D. BY: [illegible] 10/24/77 | DATE: [illegible] 10-24-77 | PAGE 53 OF 54

S.O. 145 | CALC. NO. | FILE NO. 148 | GROUP RCSA

SHOCK DIRECTION Z,Y

SHOCK TYPE SSE (DBE)

SUPPORT CASE 5,2,5

POINT 7 FREQUENCY 10.17

NODE POINT	D_x	D_y	D_z	θ_x	θ_y	θ_z
200	.000	-.000	-.000	.0000	-.0000	.0000
1210	.000	-.000	-.000	.0000	-.0000	.0000
1220	.000	-.000	-.000	.0000	-.0000	-.0000
1230	.001	-.000	-.000	.0000	-.0000	-.0000
227	.001	-.000	-.000	.0000	-.0000	-.0000
1235	.002	-.000	.000	.0000	-.0000	.0000
1240	-.001	-.000	.000	-.0000	-.0000	.0000
1250	.000	-.000	-.000	.0000	-.0000	-.0000
1255	.000	-.000	-.000	.0000	-.0000	-.0000
1260	.000	-.000	-.000	.0000	-.0000	-.0000
1265	-.000	-.000	-.000	-.0000	-.0000	-.0000
1270	-.000	-.000	-.000	-.0000	-.0000	-.0000
1275	-.000	-.000	-.000	.0000	-.0000	-.0000
1285	.000	-.000	.000	.0000	-.0000	-.0000
1290	-.000	-.000	-.000	.0000	-.0000	-.0000
1295	-.000	-.000	-.000	.0000	-.0000	.0000

NOTE: 1) D_x, D_y, D_z are in inches

2) θ_x, θ_y, θ_z are in radians

RUN NO. PCGSTEY