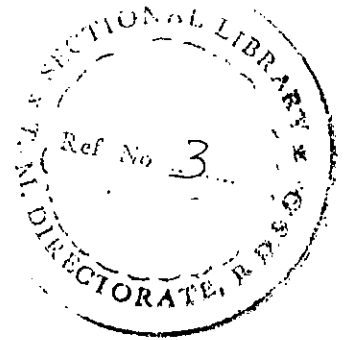


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2

GOVERNMENT OF INDIA
MINISTRY OF RAILWAYS

DYNAMIC TESTING OF TRACK PANEL COMPRISING OF
PRC SLEEPER OF NEW DESIGN TO DRG NO. T-5475



REPORT NO. TM-3

JAN. 1995

09093

RESEARCH DESIGNS AND STANDARDS ORGANISATION

LUCKNOW - 226011

This report is based on study made by the Track Machines and Monitoring Dte. of RDSO. Although, every care has been taken in analysing it objectively, the views expressed in this report are subject to modifications from time to time in the light of fresh data. Further, they do not necessarily represent the views of the Ministry of Railways (Railway Board), Government of India.

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O.P. AGARWAL
Jt. Director (TM)

A.P. MISHRA
Director (TM)

यह रिपोर्ट अ.अ.मा.सं. के रेलपथ मशीन और मॉनिटरिंग निदेशालय द्वारा किये गये अध्ययन पर आधारित है। यद्यपि इतना ध्यान रखा गया है कि रिपोर्ट में त्रुटि कम करने में पूरी सावधानी बरती गयी है फिर भी इन रिपोर्ट में वक्त-विवार भारत सरकार, रेल मंत्रालय इरेलवे बोर्ड द्वारा नये आकड़ों के संदर्भ में समय-समय पर परिवर्तन किये जा सकते हैं।

यह रिपोर्ट अ.अ.मा.सं. की सम्पत्ति है तथा केवल सरकारी प्रयोग के लिए है। यदि निदेशक, अ.अ.मा.सं. की अनुमति के बिना इसे न तो जोरदार रूप से छापा जा सकता है और न ही प्रोत्साहन के रूप में प्रस्तुत किया जा सकता है। इसका कौन्सिल सुरक्षित है।

डॉ. पी. ज्ञानवाल,
संयुक्त निदेशक/रेलपथ मशीन

आदित्य प्रकाश मिश्रा,
निदेशक/रेलपथ मशीन

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TEST REPORT: DYNAMIC TESTING OF TRACK PANEL COMPRISING OF 65
SLEEPER TO DRAWING NO. T-3476 ON 60 KG RAILS

In continuation to report no. TM-2 of December 1954, the following test as desired by Track Design Directorate in their letter no. DT/DRD/D/2/587 of 8-12-54 and 19-1-55 and this office letter no. TM/TL/T1 dt. 17-12-54 and 17-1-55 have also been conducted accordingly and the results of the same are detailed below.

1.1 Tests were conducted in two phases. Firstly by laying one full length track panel and secondly under fatigue loading in Pulsator, as brought out in paras 2 & 3 respectively.

2.0 TEST ON TRACK PANEL (TEST DETAILS AND RESULTS)

2.1 The test was carried out on Track Panel Fatigue Testing Equipment in Track Lab. on one rail panel of 13 m length with sleeper density 1660/Km. i.e. sleeper spacing 60cm c/c.

2.2 The fastening used were ERC/MK-III as per RDSO's Drawing No. T-3701 with its components i.e. CR sole plate as per RDSO's Drawing No. T-3711 and G.F.N. liner as per RDSO's Drawing No. T-3706.

2.3 The ballast cushion under the sleeper was 300 mm.

2.4 The track panel was laid to proper alignment, level and gauge and manually packed.

2.5 Loading norms :

Vertical (V) = +25t to + 2t at 3.33 Hz frequency
upto 2x10⁶ cycles.

2.6 INSTRUMENTATION

Stresses in concrete sleeper were measured for static loading and under dynamic condition by strain gauges of SR-4 type, 67mm gauge length. The location of gauges for the sleeper loaded directly is shown in Fig. 1 and for the sleeper adjacent to the loaded sleeper is shown in Fig. 2.

OBSERVATIONS

The following observations and readings were taken:-

i) Variations in the gauge and cross level at every 1x10⁶ cycles.

ii) Stresses in sleepers at static load of 5t, 10t, 20t and 25t per sleeper respectively.

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sleeper and the adjacent sleeper at initial stage at every 1 million cycles.

- iii) Cracks in sleeper if any and stage at which it starts and its propagation.
- iv) Condition of fastenings after completing the test.
- v) Condition of G.R. sole plate and GFN liner after completing the test.
- vi) Track modulus initially and at every 1×10^6 cycles. (under the actuator)

2.8 RESULTS

2.8.1 The variations in gauge and cross levels at every 1×10^6 cycles are as given below.

Stage	Initial	1×10^6 cycles	2×10^6 cycles	REMARKS
Gauge in mm	1673	1673	1673	
Level	West side rail was lower by 5 mm.	-----no change-----		

2.8.2 No cracks in the sleeper were noticed during the test cycles.

2.8.3 The values of stresses (for the loaded sleeper and the adjacent one) as computed at every one million cycles upto two million cycles, i.e. completion of test, are given in Annexure-I/1 to 7.

2.8.4 Graphs showing the stresses under different loading conditions initially and at every one million cycles upto two million cycles are placed at Annexure-II/1 to 5. Annexure III/1 to 5 and Annexure IV/1 to 2.

2.8.5 Condition of fastening after completion of test.

	6	14	13
	10	9	2
	7	4	5
	1	12	3

Sl. No.	I.E.R.C. No.	Top Gas (mm)		Top Load		REMARKS
		Before Test	After Test	Before Test	After Test	
1.	10-4	18.71	18.92	950	942	
2.	10-10	20.35	20.85	842	807	
3.	10-7	19.54	19.74	1014	958	
4.	10-1	20.72	20.85	808	774	
5.	10-14	20.42	20.42	958	860	
6.	10-9	20.00	20.35	946	801	
7.	10-4	20.36	20.51	810	842	
8.	10-12	19.95	20.25	825	858	
9.	10-13	19.75	19.95	825	751	
10.	10-2	19.42	19.70	820	808	
11.	10-5	19.63	20.20	1032	939	
12.	10-3	18.03	18.17	1118	1087	

2.8.6 Condition of G.R. Sole Plate and GFN liners:- No deterioration was observed.

2.8.7 The value of track modulus has been calculated as per formula given below:-

$$U = \frac{P}{4Y} \left(\frac{4}{3} - \frac{1}{I} \right)$$

Where, U (Track Modulus) in Kg/cm/cm.

Y (deflection) in mm

P (Load on sleeper) in t

I (Moment of inertia of rail section in cm⁴)

3.0 CONVENTIONAL SATELITE LOADING TEST UNDER PULSATOR (TEST DETAILS AND RESULTS) :

3.1 The test was carried out on pulsator for one rail seat bottom under bending for a span of 650 mm.

3.2 The test arrangement has been shown in Fig-3

3.3 The loading norms:

$$\text{Vertical (V)} = +10 t - 10 t \text{ at } 5 \text{ Hz frequency up to } 2 \times 10^6$$

3.4 OBSERVATIONS :

Initial crack propagation from bottom of sleeper started at 1.775 lakh cycles and gradually started increasing, the propagation with number of cycles shown in Fig 4 and 5 to east side west side respectively.

3.5 Finally the sleeper failed at 11.625 lakh cycles. The photograph of failed sleeper seat for east side and west side are enclosed.

4.0 SUMMARISED RESULTS

The result of tests under both the conditions are summarised below.

4.1 Under Track Panel Testing Equipment :

The sleeper withstood dynamic test loading of 2t to 25t at 3.33 Hz.

4.2 Under Pulsator Loading :

The sleeper failed in the conventional fatigue loading under pulsator.

Encl. Annexure I/1-6, II/1-5, III/1-5 and IV/1-2.

Fig. 1,2,3,4 and 5

Photographs of failed sleeper (under rail seat bottom East and West face) - Fig. 6

DYNAMIC TESTING OF RAIL SLEEPER, DRAWING NO. T-2475 FOR 60 Kg
RAIL OF R.G. UNDER ROAD TRACK PANEL FATIGUE TESTING
EQUIPMENT

Gauge Resistance = 120.2 ohm

G.F. = 2.1

Shunt Resistance = 200 k ohm

Calibration factor 25% strain = 30 mm

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Young Modulus for concrete (E) = 4.675×10^4 Kg/cm²

Stress Value at Initial Stage i.e. Zero cycles

Loading (Max/Min) (t)	Gauge no.	Division		Output Stress (kg/cm ²)		Stress Range (Kg/cm ²)
		min (mm)	max (mm)	min	max	
IV=25/2	1	0	-2	0	-9.3	9.30
	2	2	10	9.3	46.5	37.20
	3	-2.5	-11	-11.6	-51.1	39.50
	4	-4.5	-13	-20.9	-60.45	39.55
	5	0.75	10.75	3.5	50.0	46.50
	6	0	3	0	13.95	13.95
	7	0	1	0	4.65	4.65
	8	2	8.5	9.3	39.50	30.20
	9	-2.5	-10	-11.6	-46.50	34.90
	10	-4.5	-12	-20.9	-55.60	34.90
	11	0.75	8	3.50	37.20	33.70
	12	0	0.5	0	2.30	2.30
	13	0	-1.0	0	-4.65	4.65
	14	2.0	6.75	9.30	31.30	24.00
	15	1.0	3.0	4.65	13.95	9.30
	16	0	1.0	0	4.65	4.65
	17	2.0	4.0	9.30	18.60	9.30
	18	0.5	4.0	2.30	18.60	16.30

Note: (1) (-) Indicate Compressive stress.

(2) Gauge no. 1 to 12 are on Loaded Sleeper.

(3) Gauge no. 13 to 15 are on Adjacent

DYNAMIC TESTING OF RSD SLEEPER, DRAWING NO. T-5475 FOR 50 K
RAIL OF E.G. UNDER "SPAN TRACK PANEL FATIGUE TESTING
EQUIPMENT"

Gauge Resistance = 120.2 ohm

G.F. = 2.1

Shunt Resistance = 200 k ohm

Calibration factor 286 strain = 30 mm

Young Modulus for concrete (E) = 4.875×10^6 Kg/cm²

Stress Value at 1×10^6 cycles

Loading (Max/Min) (t)	Gauge no.	Division		Output Stress		Stress Range (kg/cm ²)
		min (mm)	max	min (kg/cm)	max	
V=25/2	1	0	- 1.25	0	- 5.8	5.8
	2	1	8	4.65	38.40	33.75
	3	- 1.75	7	- 8.1	- 32.55	24.45
	4	- 2.50	- 9	- 11.6	- 41.9	30.3
	5	2	9.5	9.3	44.2	34.9
	6	0.5	3.0	2.3	13.95	11.65
	7	0.5	1	2.3	4.65	2.35
	8	1.25	7	5.8	32.55	26.75
	9	- 2.75	- 9	- 12.8	- 41.85	29.05
	10	- 2.0	- 11	- 13.95	- 51.1	37.15
	11	1.5	8.50	7.0	39.5	32.5
	12	0.5	1.5	2.3	7.0	4.7
	13	0	1.0	0	4.65	4.65
	14	1.0	2.25	4.65	10.5	5.85
	15	1.0	3.0	4.65	13.95	9.30
	16	0	2.5	0	11.6	11.60
	17	0	1.0	0	4.65	4.65
	18	0.5	5.0	2.3	23.25	20.95

Note: (1) (-) Indicate Compressive stress.

(2) Gauge no. 1 to 12 are on Loaded Sleeper.

(3) Gauge no. 13 to 18 are on Adjacent to Loaded Sleeper.

DYNAMIC TESTING OF RSC SLEEPER, DRAWING NO. T-5475 FOR 60 Kc
RAIL OF 2.5 UNDER "RAIL TRACK PANEL FATIGUE TESTING
EQUIPMENT"

Gauge Resistance = 130.2 ohm

G.F. = 2.1

Shunt Resistance = 200 k ohm

Calibration factor 286 strain = 30 mm

Young Modulus for concrete (E) = 4.875×10^6 Kg/cm²

Stress Value at 2×10^6 cycles

Loading (Max/Min) (t)	Gauge no.	Division (mm)		Output Stress (kg/cm ²)		Stress Range (Kg/cm ²)
		min	max	min	max	
V=25/2	1	0	-1	0	-4.65	4.65
	2	0.5	6	2.3	27.9	25.60
	3	-1	-2.5	-4.65	-11.6	6.95
	4	-2.0	-6.0	-9.30	-27.90	18.60
	5	2.0	4.5	9.30	20.9	11.60
	6	1.0	3.0	4.65	13.95	9.30
	7	0	2.5	0	11.6	11.6
	8	0.5	5.0	2.30	23.25	21.05
	9	-1	-3.75	-4.65	-17.40	12.75
	10	0	-4.0	0	-18.60	18.60
	11	1.25	10.25	5.80	47.70	41.90
	12	0	0.5	0	2.3	2.3
	13	0.5	1.0	2.3	4.65	2.35
	14	1.0	2.0	4.65	9.30	4.65
	15	1.0	3.0	4.65	13.95	9.30
	16	0	2.25	0	10.50	10.50
	17	1.0	1.0	4.65	4.65	0
	18	0.75	4.25	3.50	19.60	16.10

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Note: (1) (-) Indicate Compressive stress.

(2) Gauge no. 1 to 12 are on Loaded Sleeper.

(3) Gauge no. 13 to 18 are on Adjacent to loaded sleeper.

DYNAMIC TESTING OF RSD SLEEPER. DRAWING NO. T-5475 FOR 50 Kc
RAIL OF S.G. UNDER "RAIL TRACK PANEL FATIGUE TESTING
EQUIPMENT"

Gauge Resistance = 120.2 ohm

G.F. = 2.1

Shunt Resistance = 200 k ohm

Calibration factor 266 strain = 30 mm

Young Modulus for concrete (E) = 4.875x10 Kg/cm

Stress Value at initial stage i.e. zero cycle.

Static Load	5 t	10 t	15 t	20 t	25 t
	Div-1 Str-1	Div-2 Str-2	Div-3 Str-3	Div-4 Str-4	Div-5 Str-5
	Gauge no. 1	Gauge no. 2	Gauge no. 3	Gauge no. 4	Gauge no. 5
1	-0.5	-2.3	-1.25	-5.8	-1
2	3	113.95	5	123.25	7.5
3	4	18.6	7.5	34.9	8
4	5	23.2	8.5	39.5	10
5	5	23.2	5.5	25.6	7.5
6	2	9.3	1.5	7.0	2
7	0	0	0.25	1.16	0.5
8	2.5	11.6	3.25	15.1	5
9	4	18.6	6.5	30.2	7.5
10	4.5	20.9	9	37.2	8.5
11	5	23.25	3	113.95	4.75
12	0	0	0	0	0.25
13	0	0	0	0	0
14	2.5	11.6	4.75	22.1	6
15	1	4.65	1.5	7.0	2
16	0	0	0	0	0.5
17	2	9.3	3.5	16.3	4
18	1	4.65	2	9.3	2.75

Notes: (1) (-) Indicate Compressive stress.
 (2) Gauge no. 1 to 12 are on Loaded Sleeper.
 (3) Gauge no. 13 to 18 are on Adjacent to Loaded Sleeper.

DYNAMIC TESTING OF RSC SLEEPERS, DRAWING NO. T-5475 FOR 30 Kc
FAIL OF S.E. UNDER "RAIL TRACK PANEL" FATIGUE TESTING
EQUIPMENT"

Gauge Resistance = 120.2 ohm

G.F. = 2.1

Shunt Resistance = 200 k ohm

Calibration factor 286 strain = 30 mm

Young Modulus for concrete (E) = 4.275×10^5 Kg/cm²

Stress Value at 1 million cycle.

S.No.	5 t		10 t		15 t		20 t		25 t	
	Div	Str	Div	Str	Div	Str	Div	Str	Div	Str
1	0	0	-0.23	-1.20	-0.5	-2.3	-0.75	-3.5	-1	-4
2	2	9.3	4	19.6	5.5	25.6	7	30.5	8.5	39
3	-3.5	-16.3	-4.5	-20.9	-5.5	-25.6	-5	-23.3	-6	-27
4	-4	-18.6	-5.75	-26.7	-6.5	-30.2	-8	-37.2	-7	-41
5	3	13.95	4.5	20.9	6.5	30.2	8	37.2	9.5	44
6	1	4.65	1.5	7.0	2	9.3	2.75	12.8	3	13
7	0.5	2.3	0.5	2.3	10.75	3.5	1	4.65	1	4.6
8	2	9.3	3	13.95	4.5	20.9	6	27.9	7	32.5
9	-4	-18.6	-6	-27.9	-7	-32.5	-8.5	-39.5	-9	-41.8
10	-4	-18.6	-7	-32.5	-8.75	-40.7	-10	-46.5	-11	-51.2
11	+2	+9.3	+3.5	+16.3	+5	+23.3	+7	+32.6	+9	+41
12	0	0	0.5	2.3	0.5	2.3	0.5	2.3	0.5	2.3
13	0	0	0.25	1.2	0.5	2.3	1	4.65	1	4.65
14	1.5	7.0	2	9.3	2.75	12.8	2.5	11.6	2.5	11.6
15	0.5	2.3	1	4.65	1.25	5.8	1.5	7.0	1.5	13.9
16	0	0	0	0	0.5	2.3	1	4.65	2	9.3
17	1	4.65	1.5	7.0	1	4.65	1	4.65	1.5	2.3
18	1	4.65	2	9.3	3	13.9	4	18.6	5	23.2

Note: (1) (-) Indicate Compressive stress.
 (2) Gauge no. 1 to 12 are on Loaded Sleeper.
 (3) Gauge no. 13 to 18 are on Adjacent to Loaded Sleeper.

DYNAMIC TESTING OF PCC SLEEPER, DRAWING NO. T-5475 FOR 60 Kg
PAWL OF B.G. UNDER "RAIL TRACK PANEL FATIGUE TESTING
EQUIPMENT"

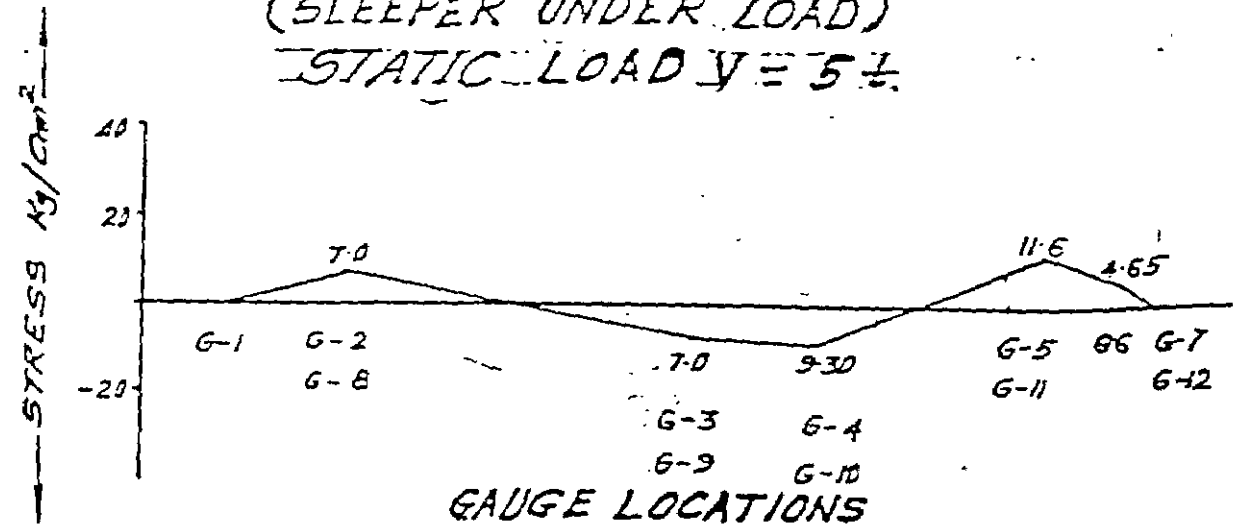
Gauge Resistance = 120.2 Ohm
 G.F. = 2.1
 Shunt Resistance = 200 k Ohm
 Calibration factor 256 strain = 30 mm

Young Modulus for concrete (E) = 4.875x10⁴ Kg/cm²
 Stress Value at 2 million cycles.

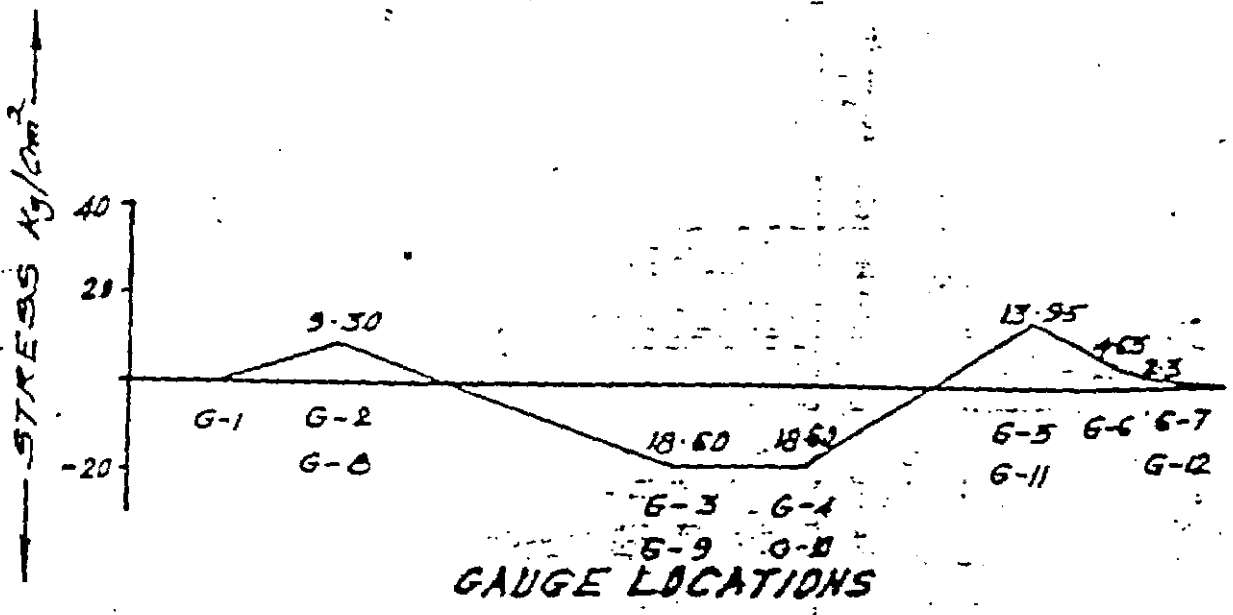
Static Load	5 t	10 t	15 t	20 t	25 t					
	Div-1	Str-1	Div-1	Str-1	Div-1	Str-1	Div-1	Str-1	Div-1	Str-1
	Gauge no. 1	Gauge no. 2	Gauge no. 3	Gauge no. 4	Gauge no. 5	Gauge no. 6	Gauge no. 7	Gauge no. 8	Gauge no. 9	Gauge no. 10
1	0	0	-0.25	-1.2	-0.51	-2.31	-0.75	-3.5	-1	-4.6
2	1.5	7.0	2.25	10.5	4	18.6	4.75	22.1	3.5	16.3
3	-1	-4.65	-1.5	-7.0	-2.5	-11.6	-3	-13.9	-4	-18.1
4	-2	-9.3	-3.5	-16.3	-4.5	-20.9	-5.5	-25.6	-6	-27.1
5	2.5	11.6	4	18.6	6	27.9	7.75	36.0	9.5	44.2
6	1	4.65	1.5	7.0	2	9.3	2.5	11.6	3	14.1
7	0	0	0	0	0	0	0.25	1.2	0.25	1.2
8	1	4.65	1.5	7.0	2.5	11.6	3.75	17.7	6	24.2
9	-1.5	-6.97	-2	-9.3	-2.5	-11.6	-3	-13.9	-4	-18.1
10	-1.75	-8.1	-3	-13.9	-4	-18.6	-4.25	-19.8	-5	-23.1
11	2	9.3	3.5	16.3	6	27.9	8.5	39.5	11	51.1
12	0	0	0	0	0	0	0	0	0	0
13	0	0	0.5	2.3	1	4.65	1.25	5.8	1	4.65
14	1.5	7.0	2.5	11.6	3	13.95	3	13.95	3	13.95
15	0.5	2.3	1	4.65	1	4.65	2	9.3	3	13.95
16	0	0	0.25	1.2	1	4.65	1.75	8.1	2.25	10.5
17	1.5	7.0	2	9.3	2	9.3	1.75	8.1	1	4.65
18	1	4.65	2	9.3	3	13.95	3.75	17.7	4.25	19.8

Notes: (1) (-) Indicate Compressive stress.
 (2) Gauge no. 1 to 12 are on Loaded Sleeper.
 (3) Gauge no. 13 to 18 are on Adjacent to Loaded Sleeper.

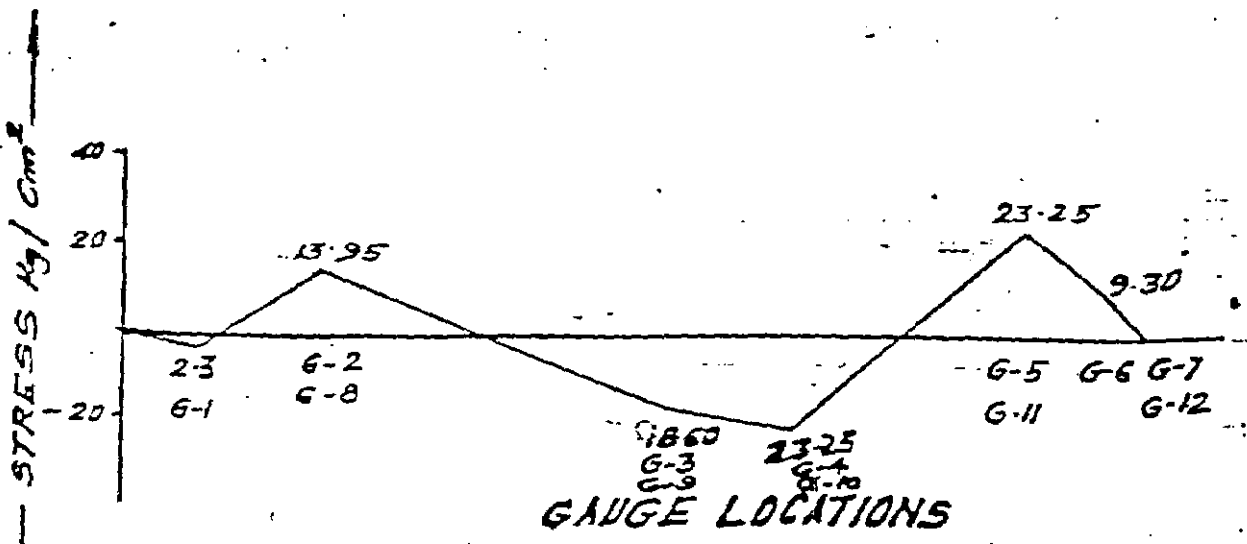
TESTING OF PSC SLEEPER FOR BG 60KG (VIC) DRGM No. 5475
 (SLEEPER UNDER LOAD)
 STATIC LOAD $\gamma = 5 \pm$



STRESS AT 2 MILLION CYCLES

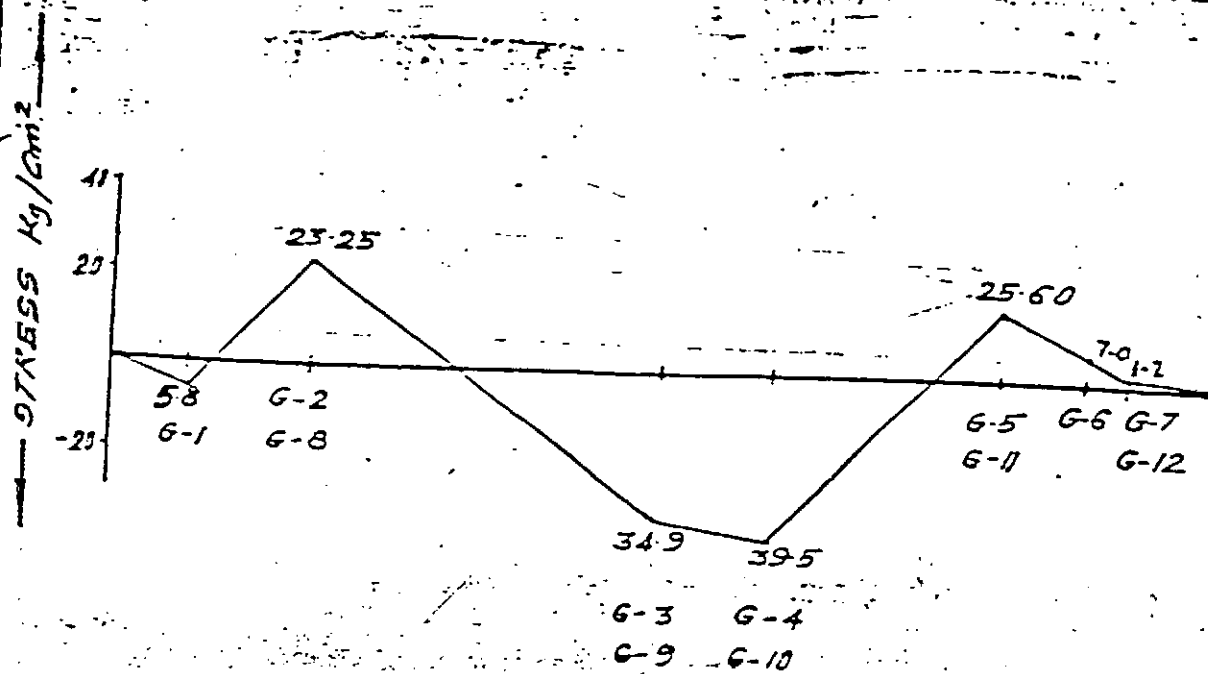
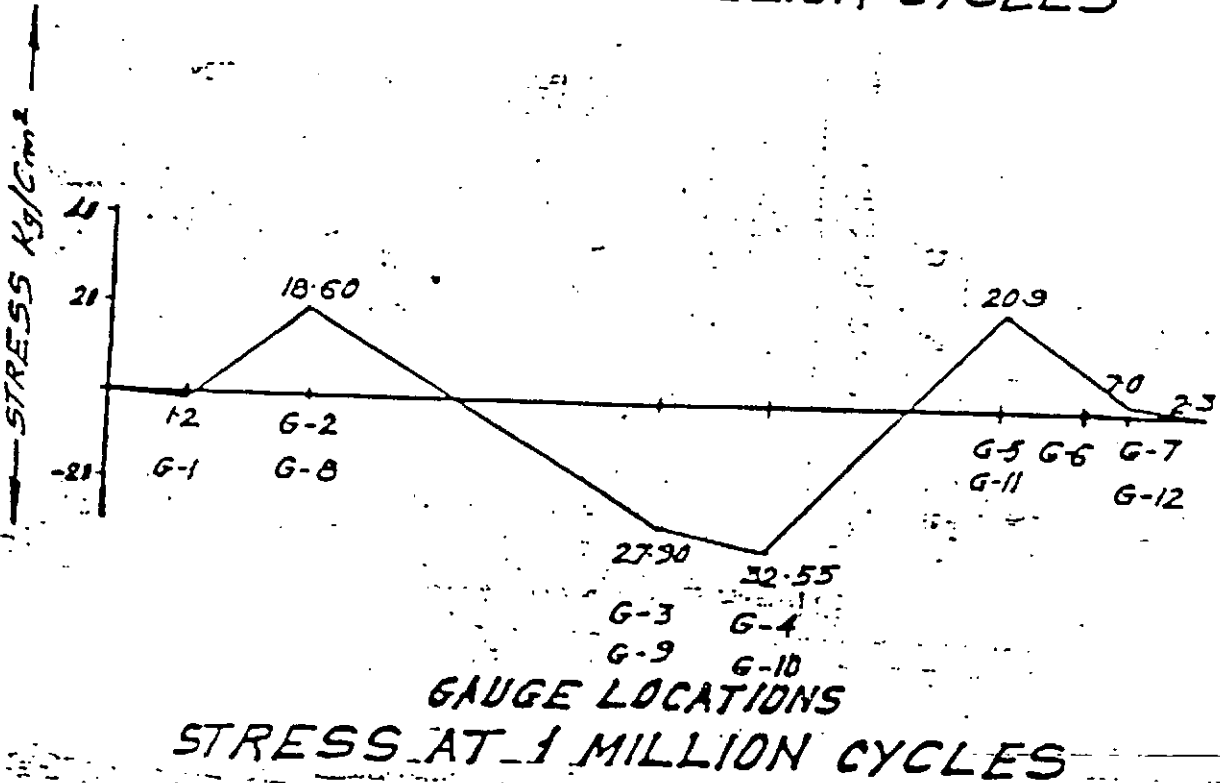
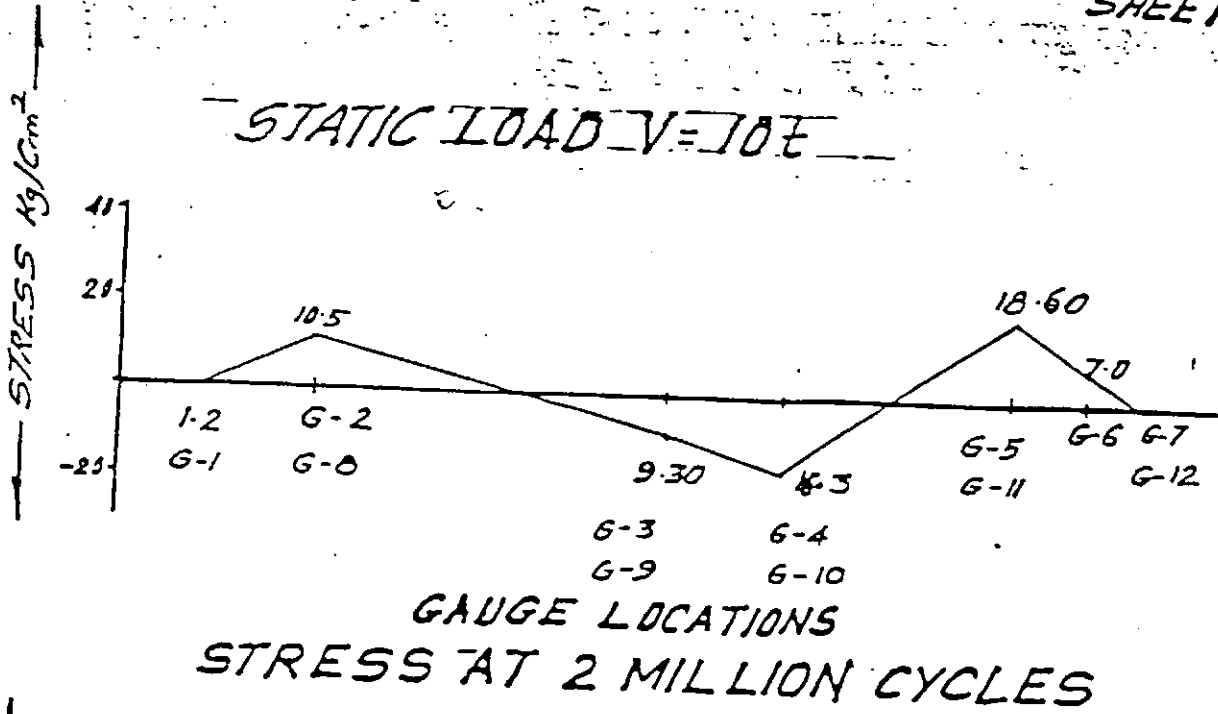


STRESS AT 1 MILLION CYCLES



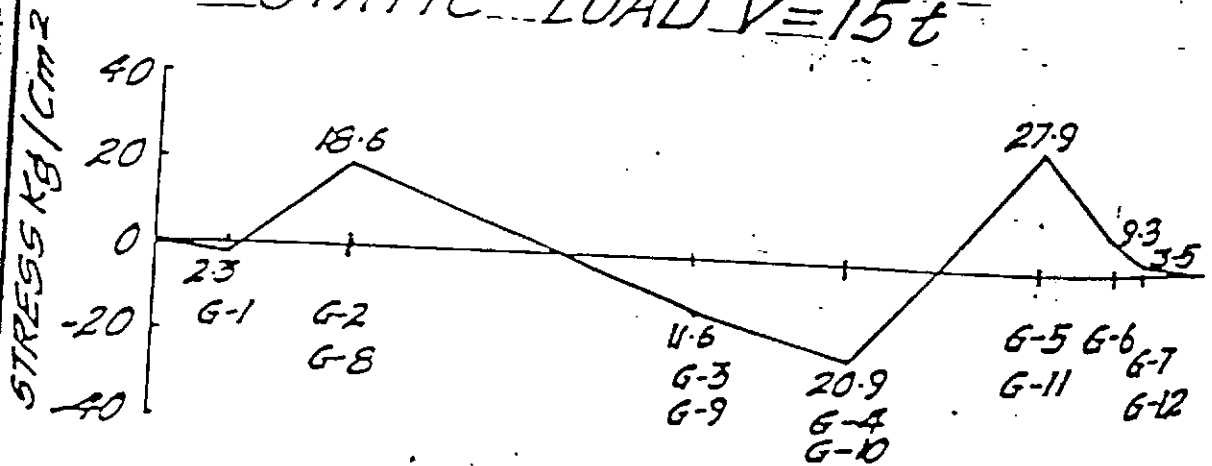
STRESS AT INITIAL STAGE

STATIC LOAD $V=10E$

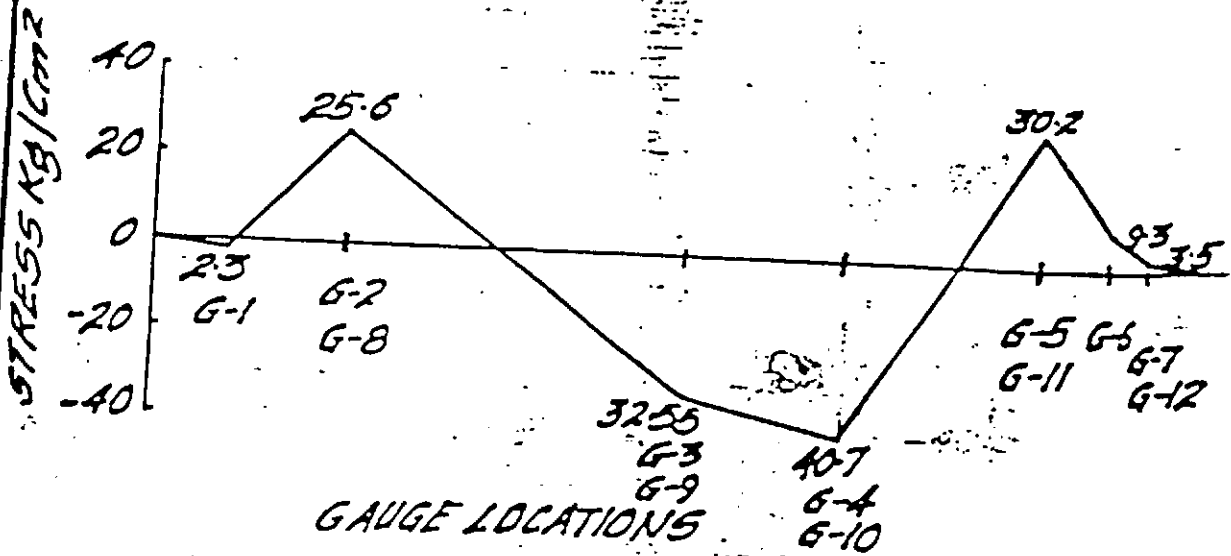


STRESS AB/C-3

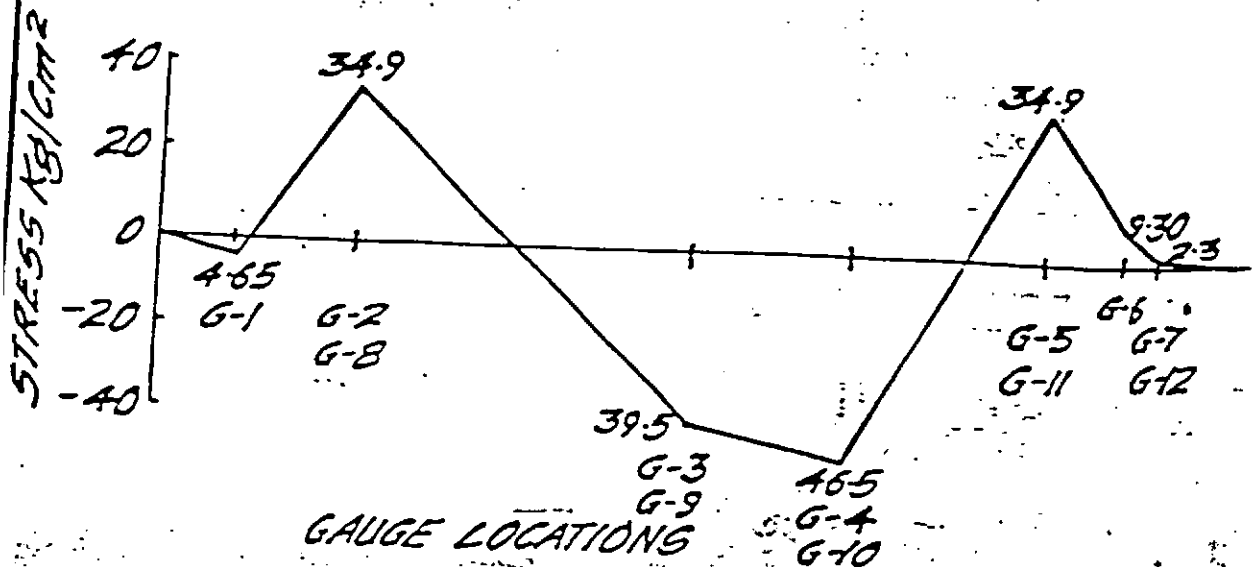
STATIC LOAD $V=15t$



GAUGE LOCATIONS
STRESS AT 2 MILLION CYCLES

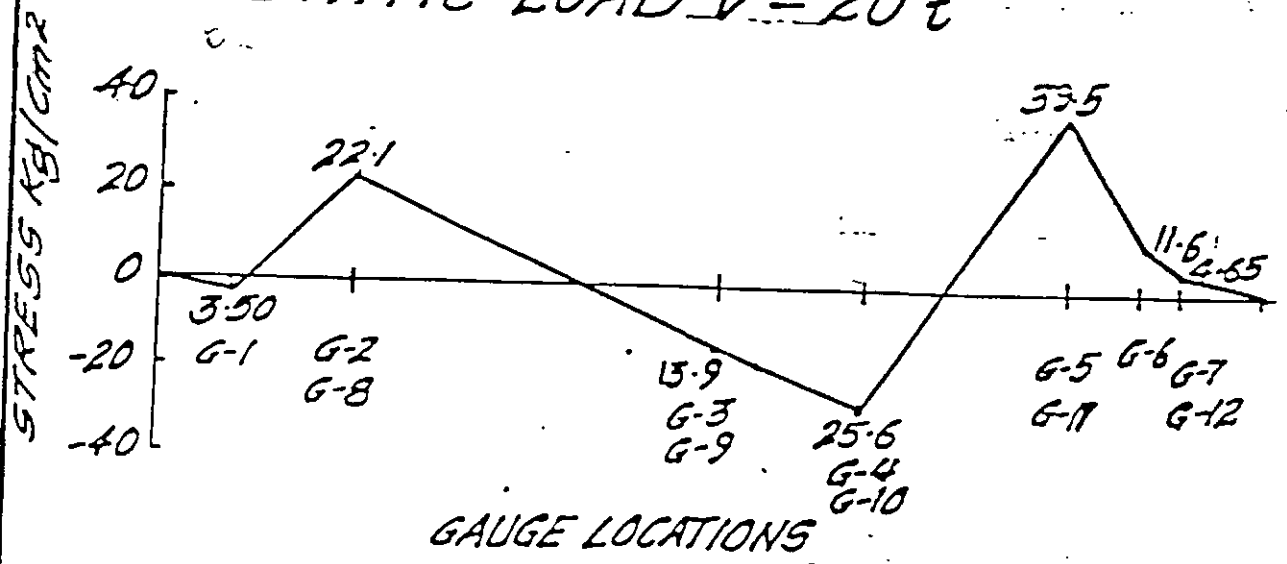


GAUGE LOCATIONS
STRESS AT 1 MILLION CYCLES

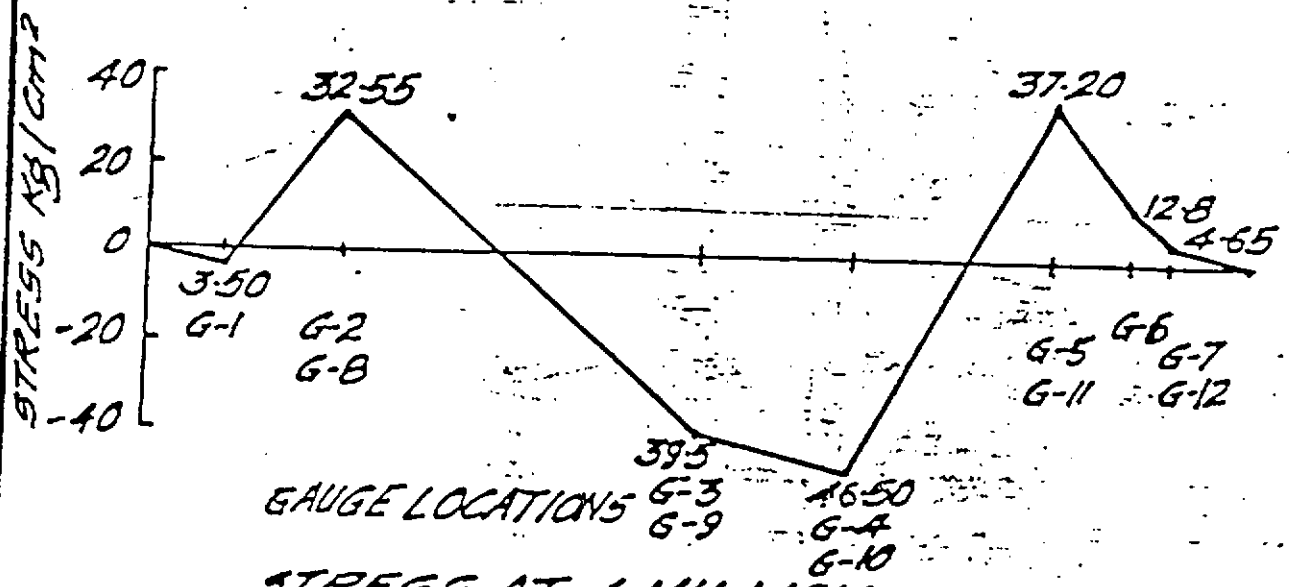


GAUGE LOCATIONS
STRESS AT INITIAL STAGE

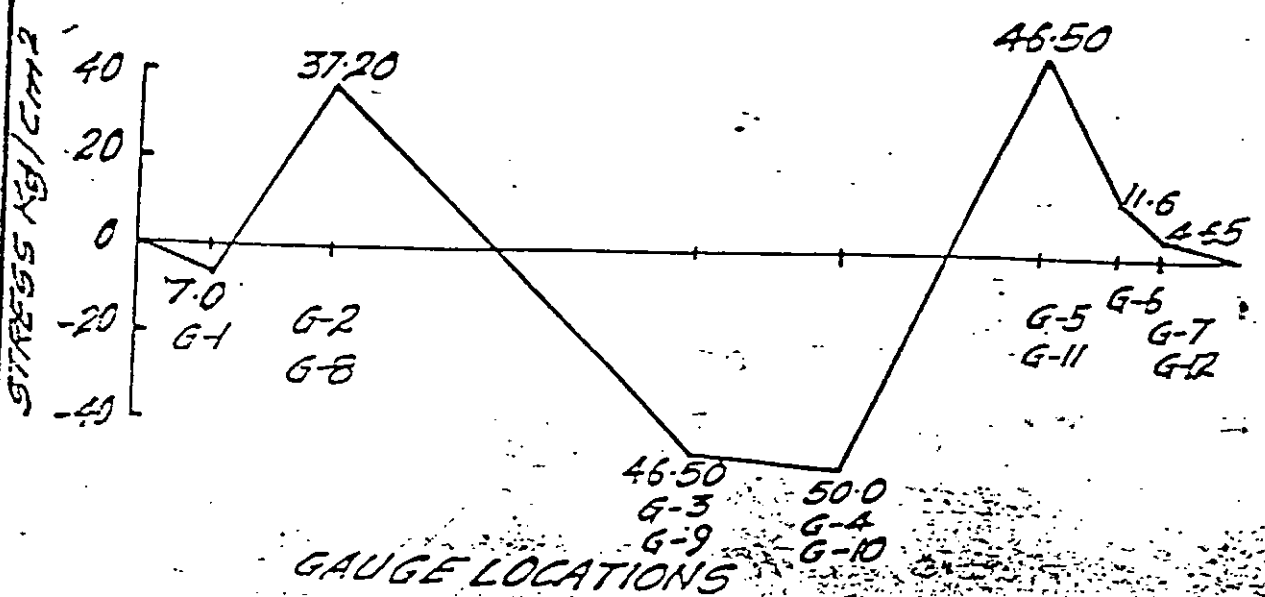
STATIC LOAD $V=20 t$



STRESS AT 2 MILLION CYCLES

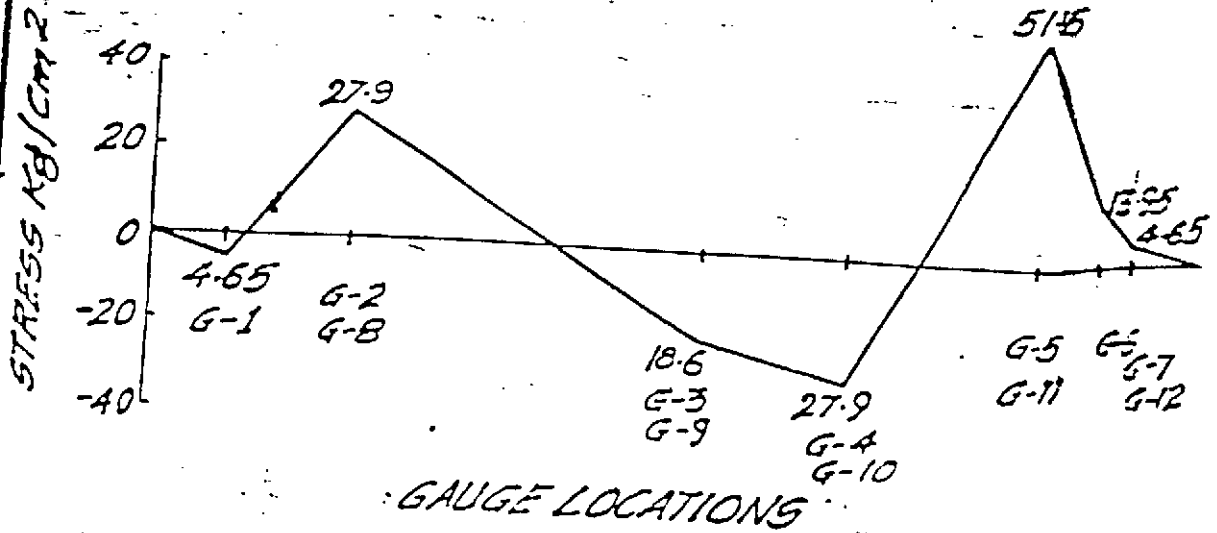


STRESS AT 1 MILLION CYCLES

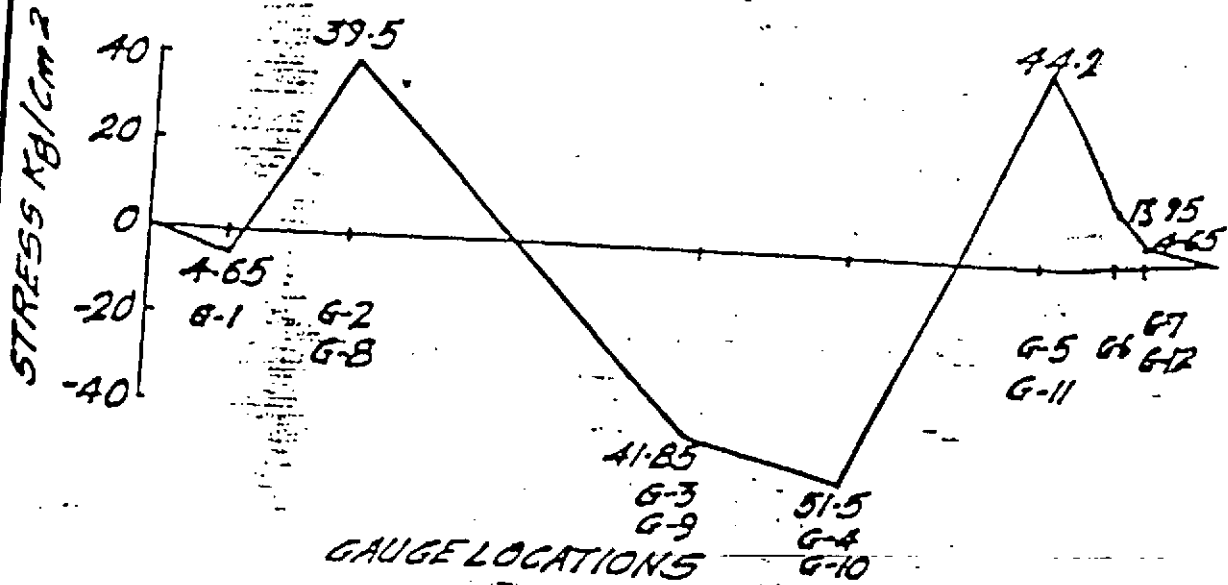


GAUGE LOCATIONS

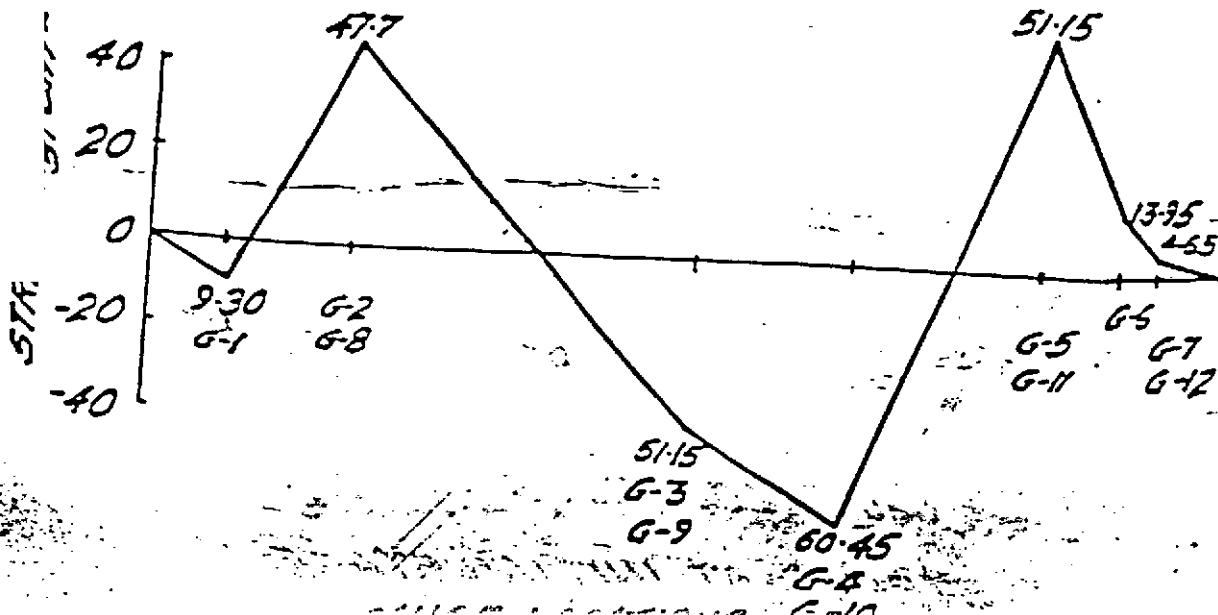
STATIC LOAD $V = 25 \text{ t}$



STRESS AT 2 MILLION CYCLES

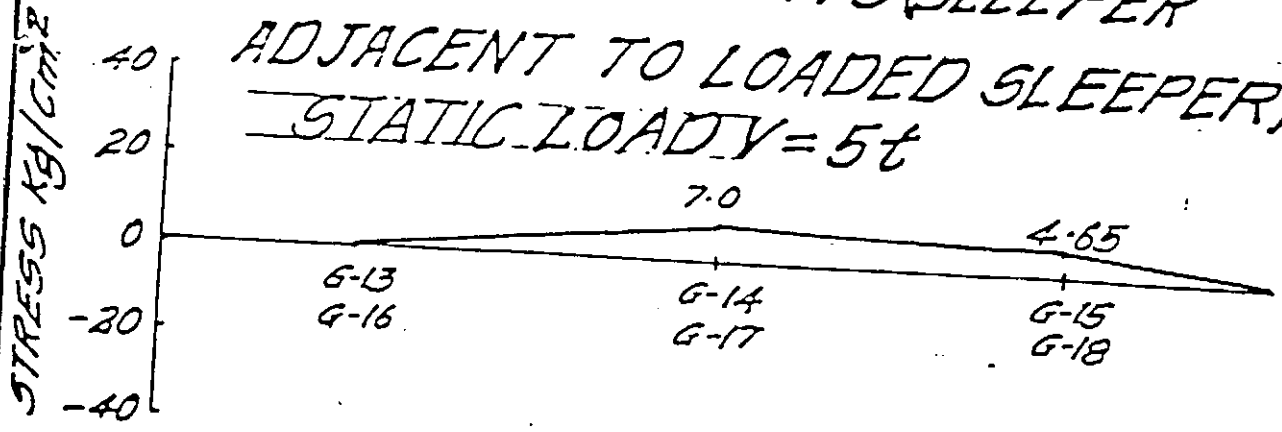


STRESS AT 1 MILLION CYCLES

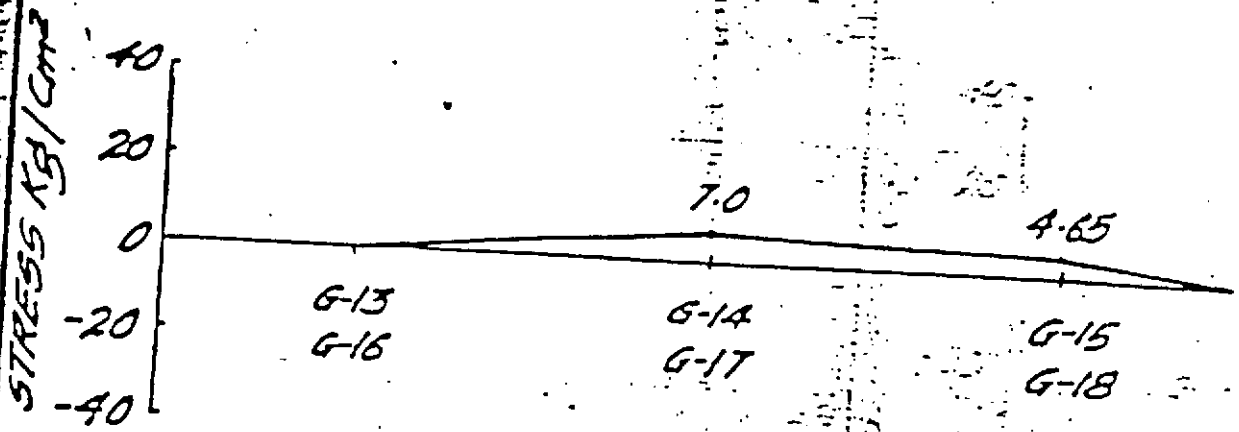


09110

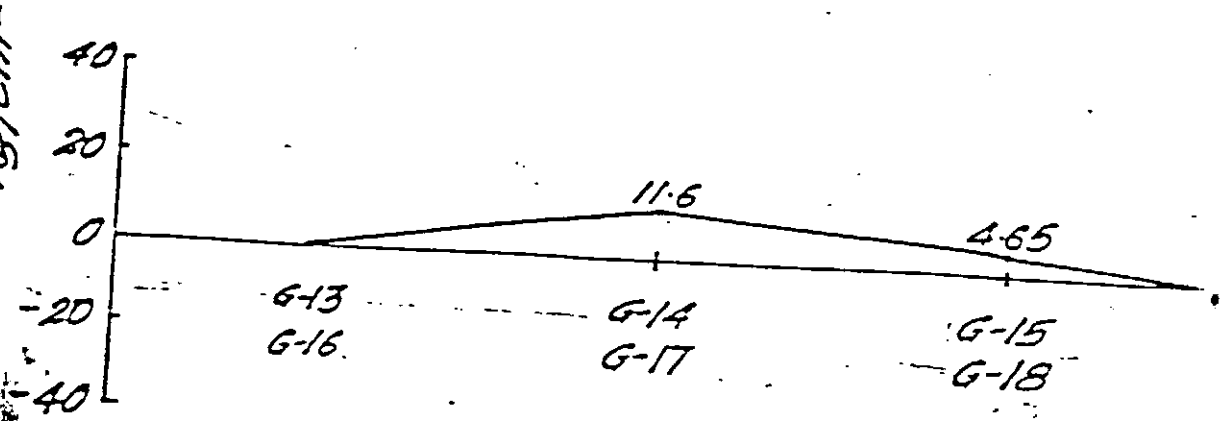
TESTING OF PSC SLEEPER FOR B.G. 60K
(UIC) DRG. NO T-5475 (SLEEPER
ADJACENT TO LOADED SLEEPER)
STATIC LOAD $V = 5t$



GAUGE LOCATIONS
STRESS AT 2 MILLION CYCLES



GAUGE LOCATIONS
STRESS AT 1 MILLION CYCLES



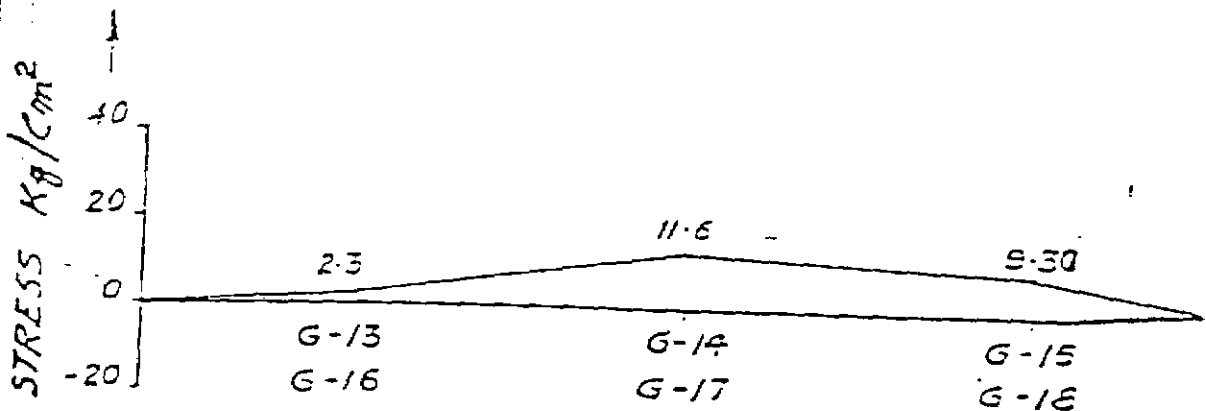
GAUGE LOCATIONS
STRESS AT INITIAL STAGE

STRESS Kg/cm^2

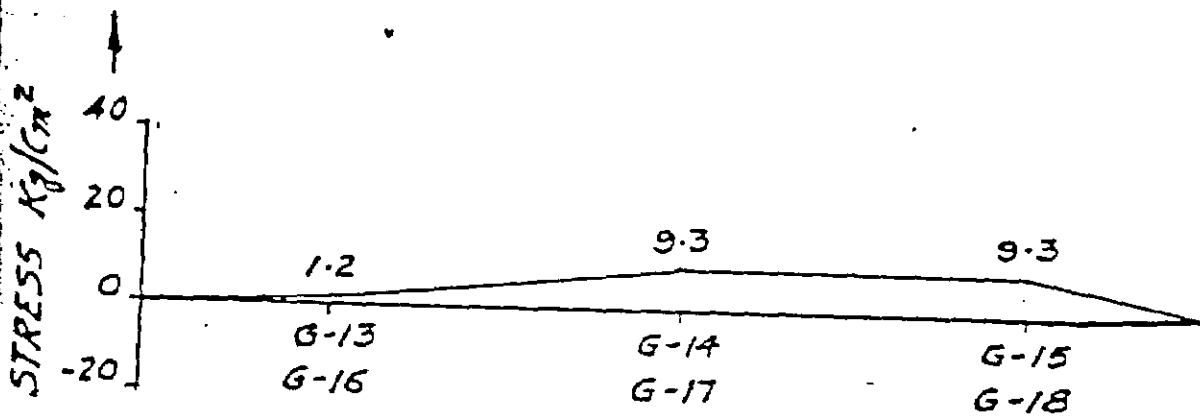
STRESS Kg/cm^2

60Kg
P)

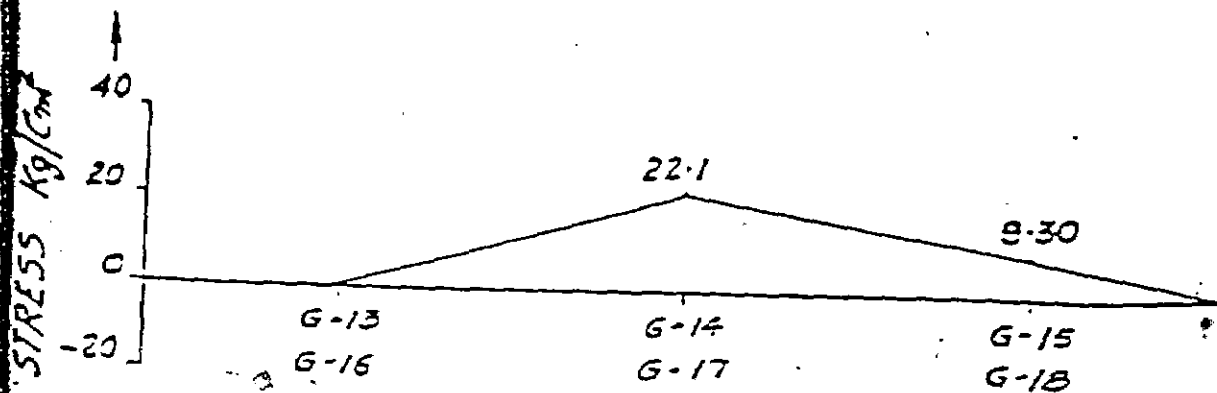
STATIC LOAD $V=10t$



GAUGE LOCATIONS
STRESS AT 2 MILLION CYCLES



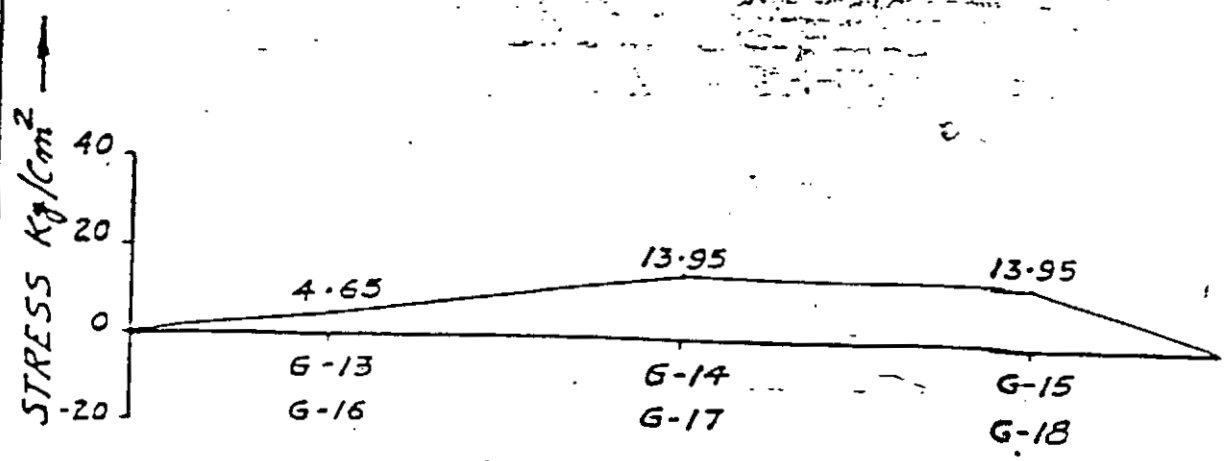
GAUGE LOCATIONS
STRESS AT 1 MILLION CYCLES



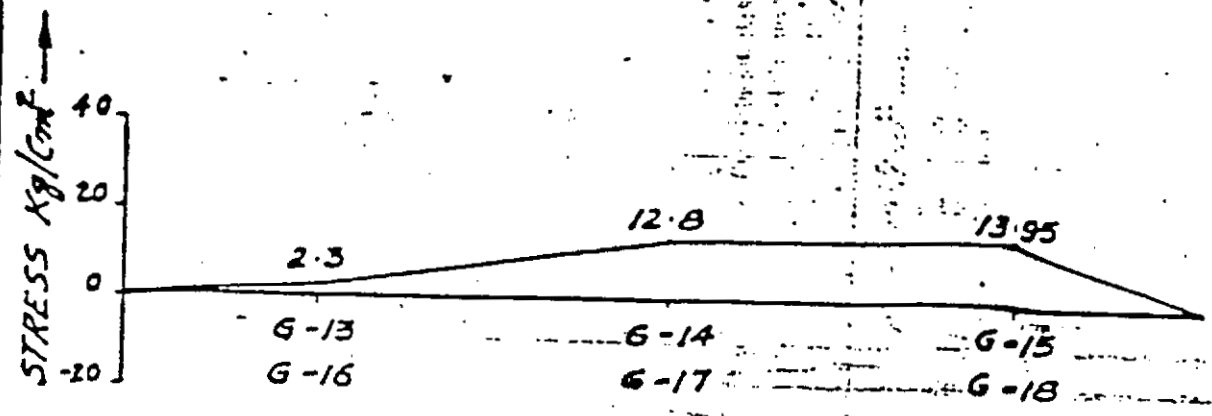
GAUGE LOCATIONS
STRESS AT INITIAL STAGE

09112

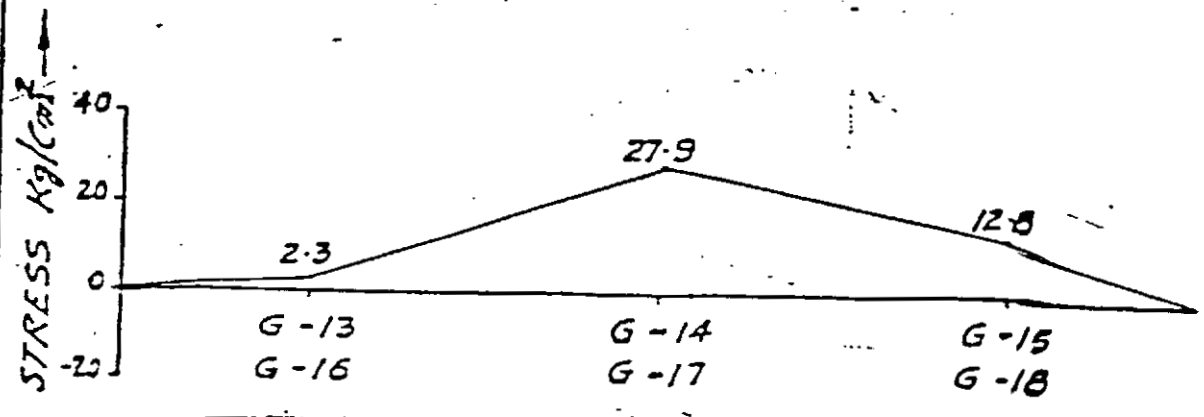
STATIC LOAD $V=15t$



GAUGE LOCATIONS
STRESS AT 2 MILLION CYCLES



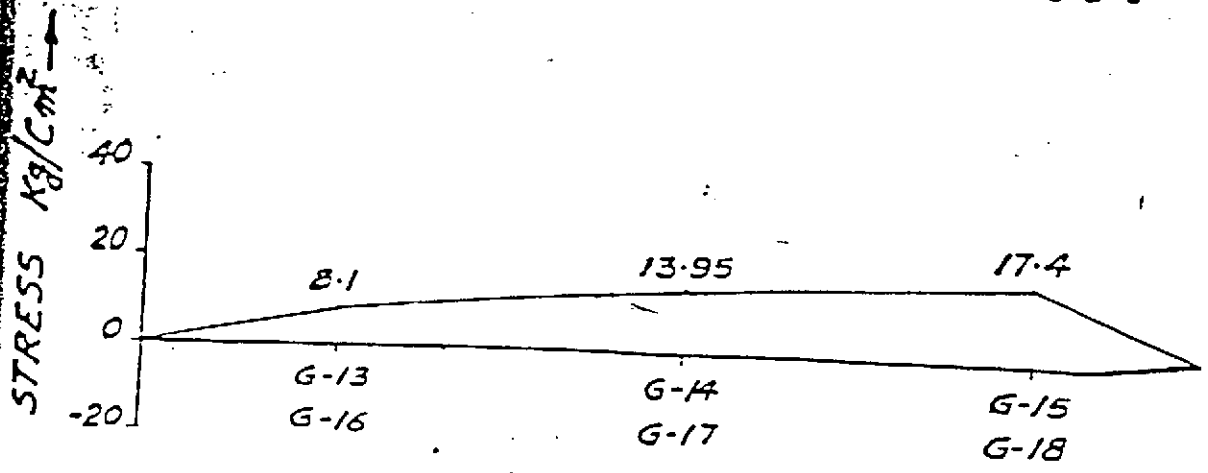
GAUGE LOCATIONS
STRESS AT 1 MILLION CYCLES



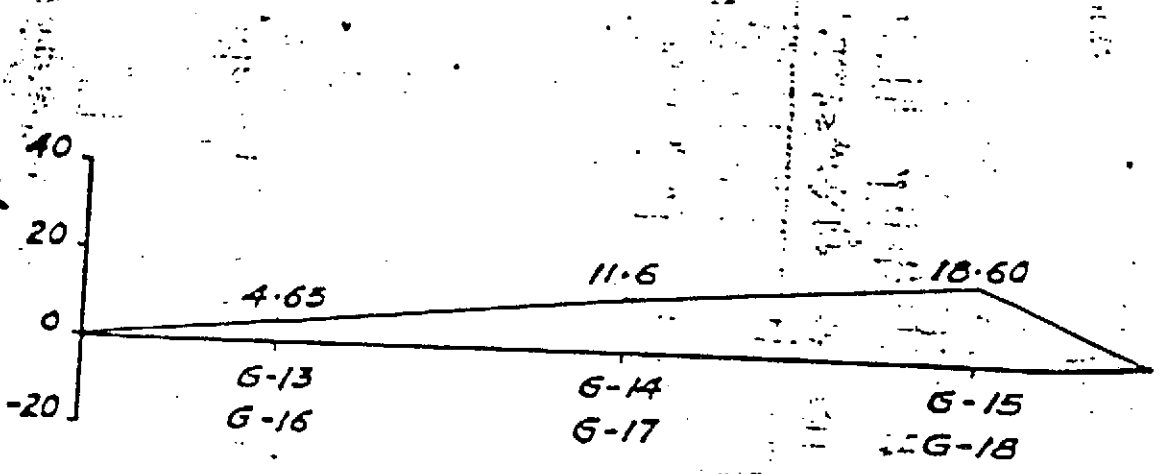
GAUGE LOCATIONS
STRESS AT INITIAL STAGE

STRESS Kg/cm²

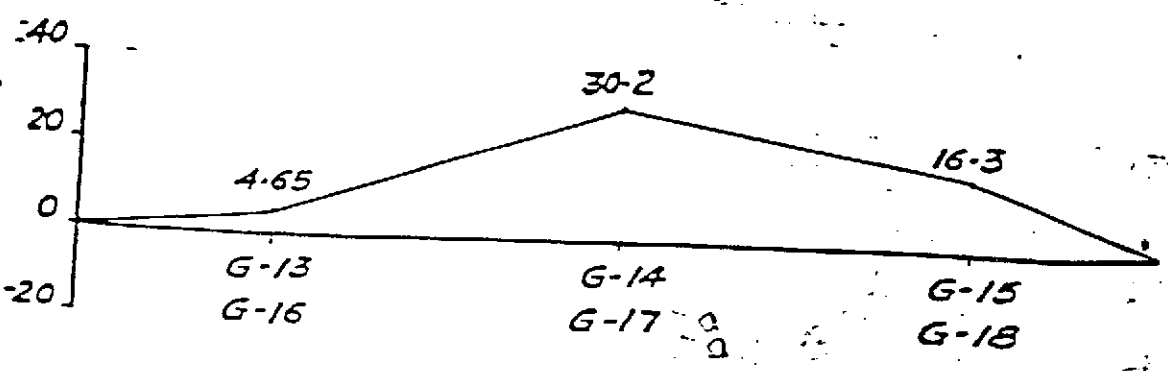
STATIC LOAD V=20t



GAUGE LOCATIONS
STRESS AT 2 MILLION CYCLES



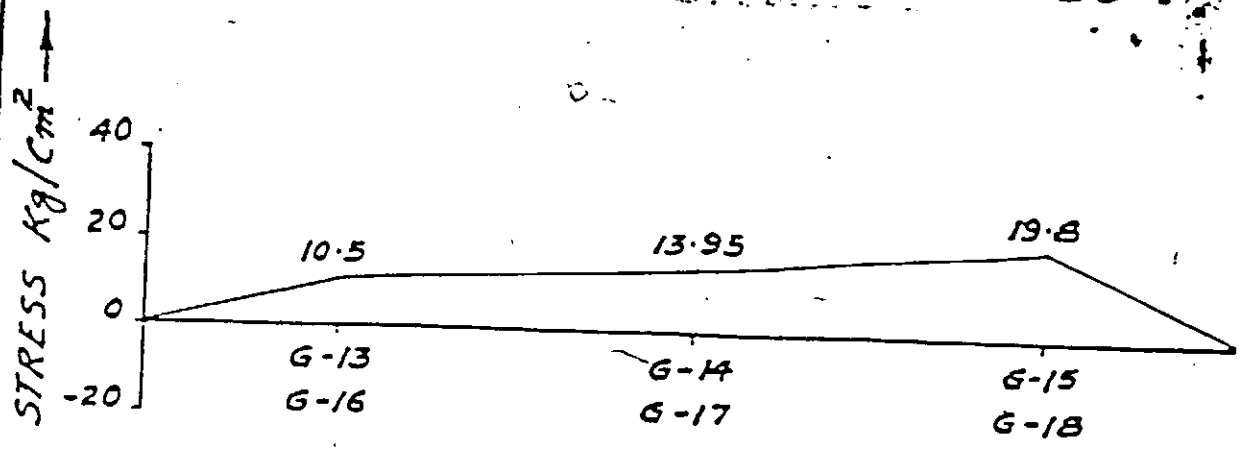
GAUGE LOCATIONS
STRESS AT 1 MILLION CYCLES



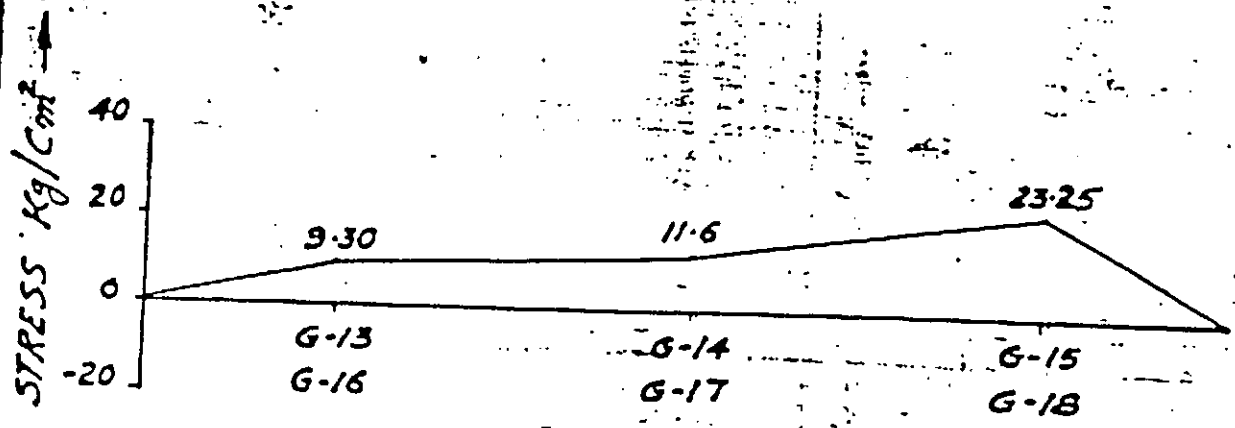
GAUGE LOCATIONS
STRESS AT INITIAL STAGE

09114

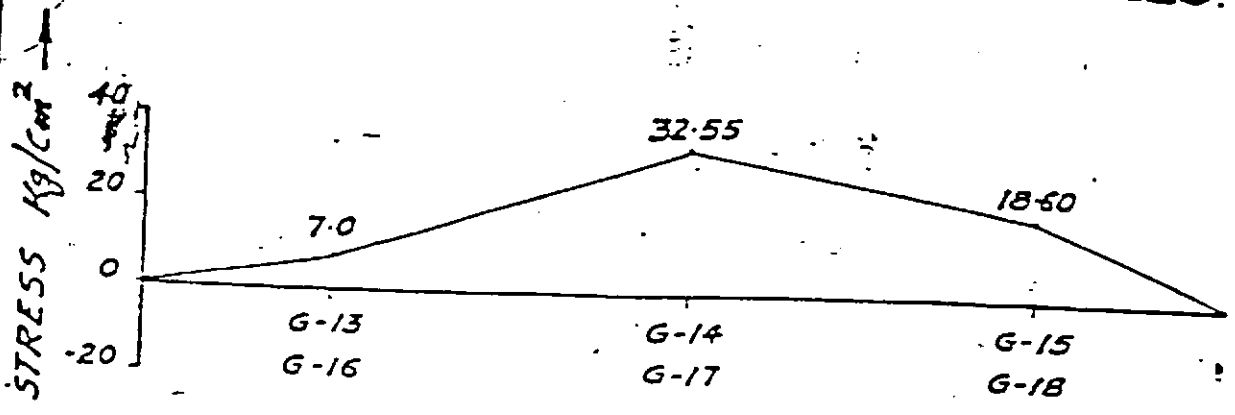
STATIC LOAD $V=25+$



GAUGE LOCATIONS
STRESS AT 2 MILLION CYCLES.



GAUGE LOCATIONS
STRESS AT 1 MILLION CYCLES.



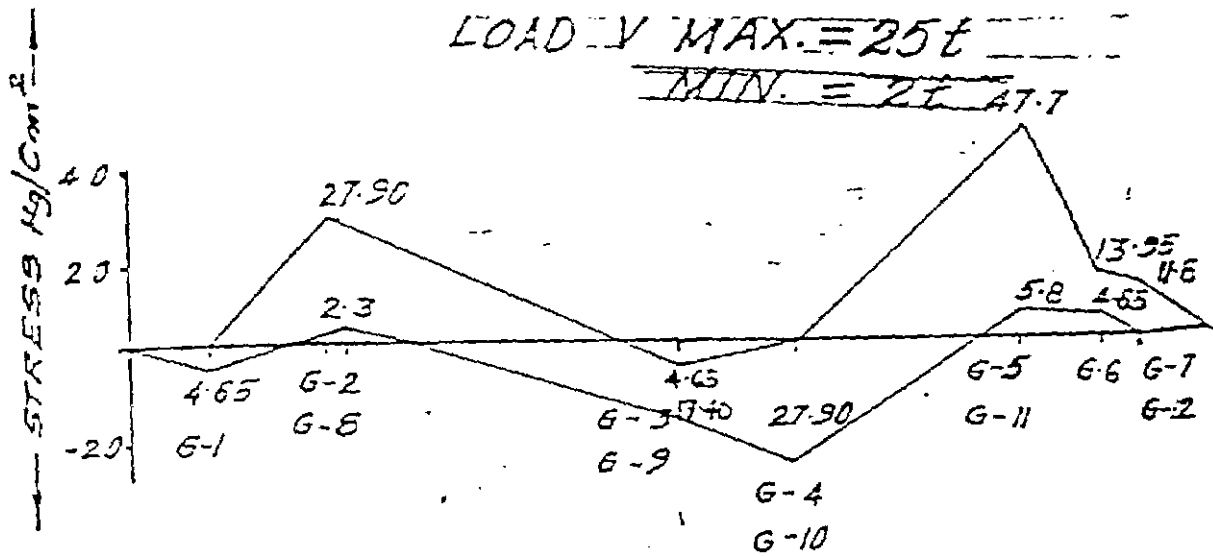
GAUGE LOCATIONS
STRESS AT INITIAL STAGE

STRESS Kg/cm²

TESTING OF PSC SLEEPER FOR BG 60 KG. (VIC) DRG. N.5475
SLEEPER UNDER LOAD

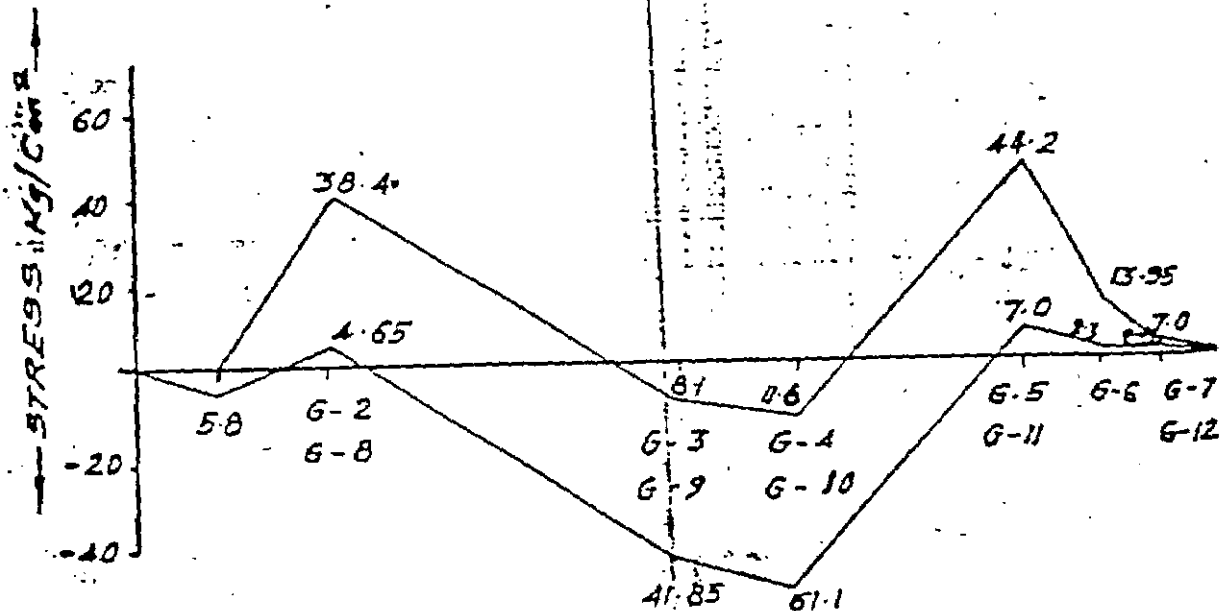
LOAD V MAX. = 25t

MIN. = 2t AT 7



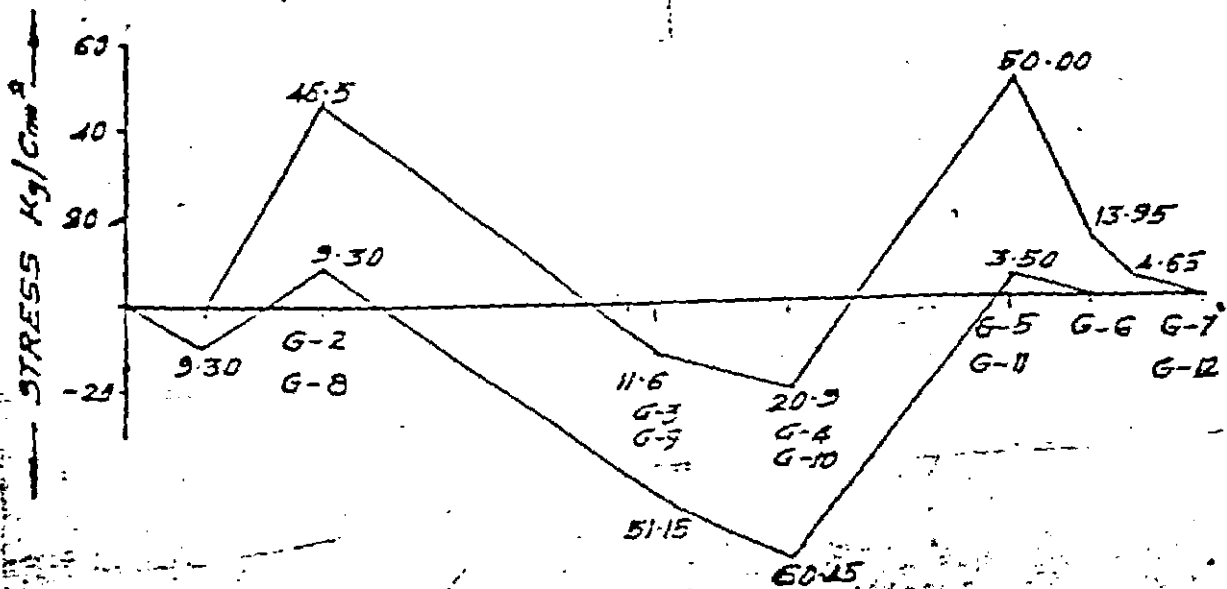
GAUGE LOCATIONS

MAXIMUM & MINIMUM STRESS RANGE AT 2 MILLION CYCLES



GAUGE LOCATIONS

MAXIMUM & MINIMUM STRESS RANGE AT 1 MILLION CYCLES



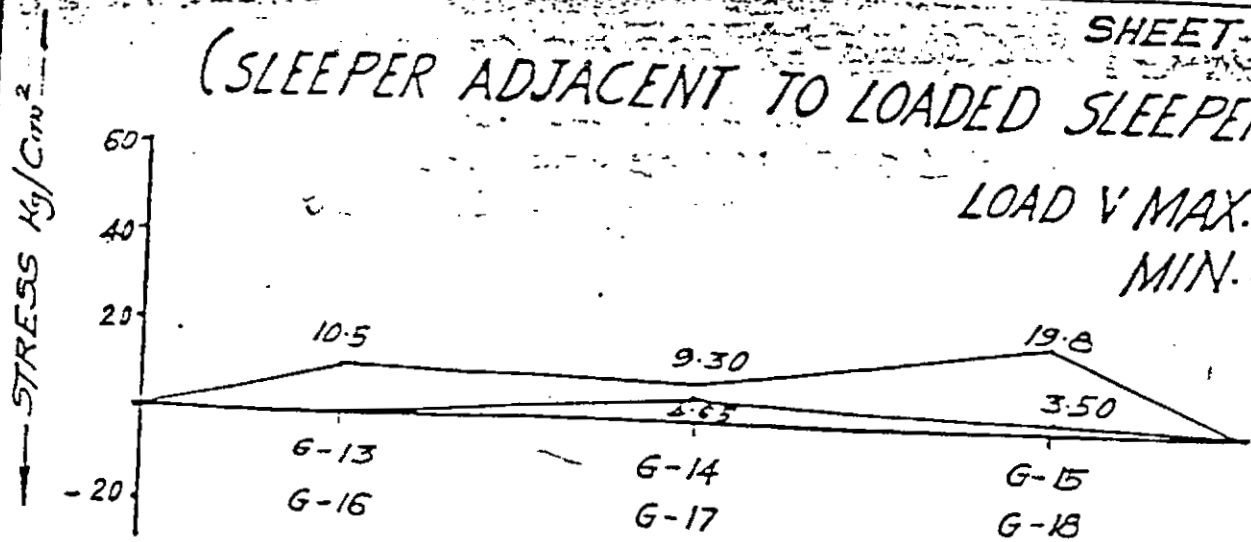
GAUGE LOCATIONS

MAXIMUM & MINIMUM STRESS RANGE AT 1 MILLION CYCLES

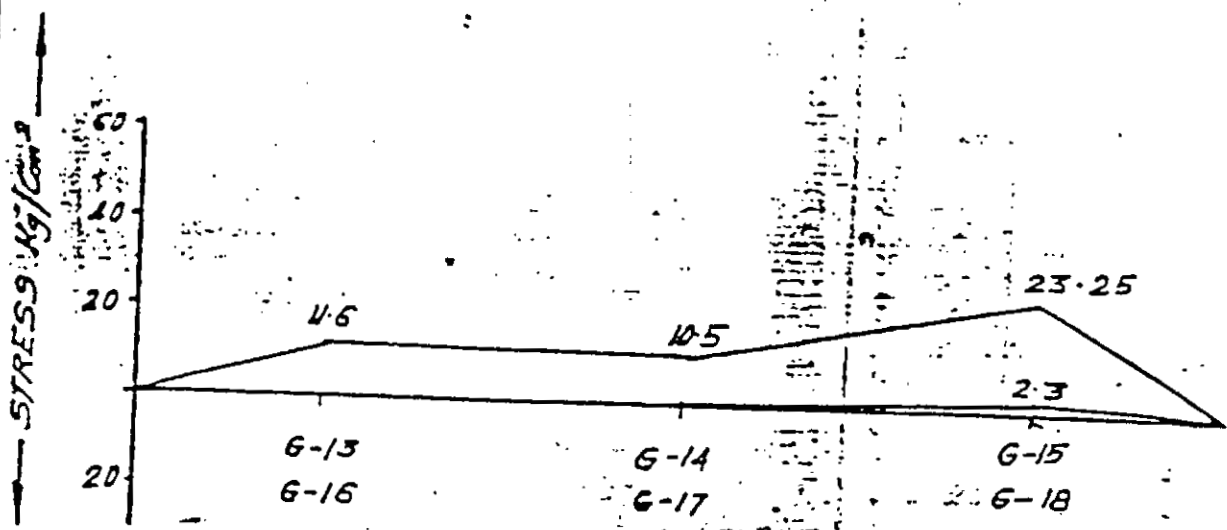
.09116

(SLEEPER ADJACENT TO LOADED SLEEPER)

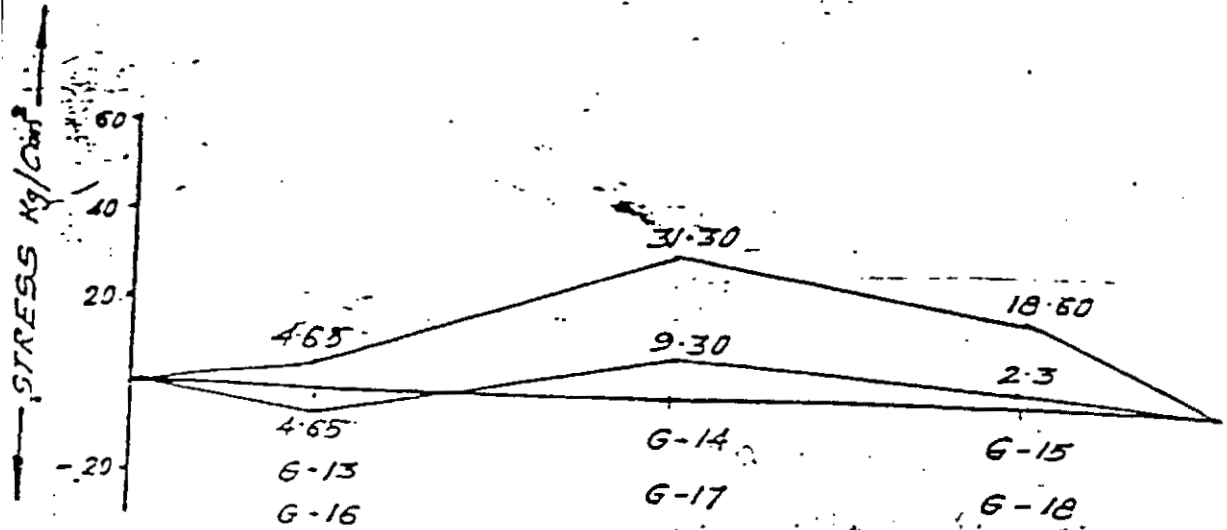
LOAD V MAX. = 25t
MIN. = 2t



GAUGE LOCATIONS
MAXIMUM & MINIMUM STRESS RANGE AT 2 MILLION CYC.

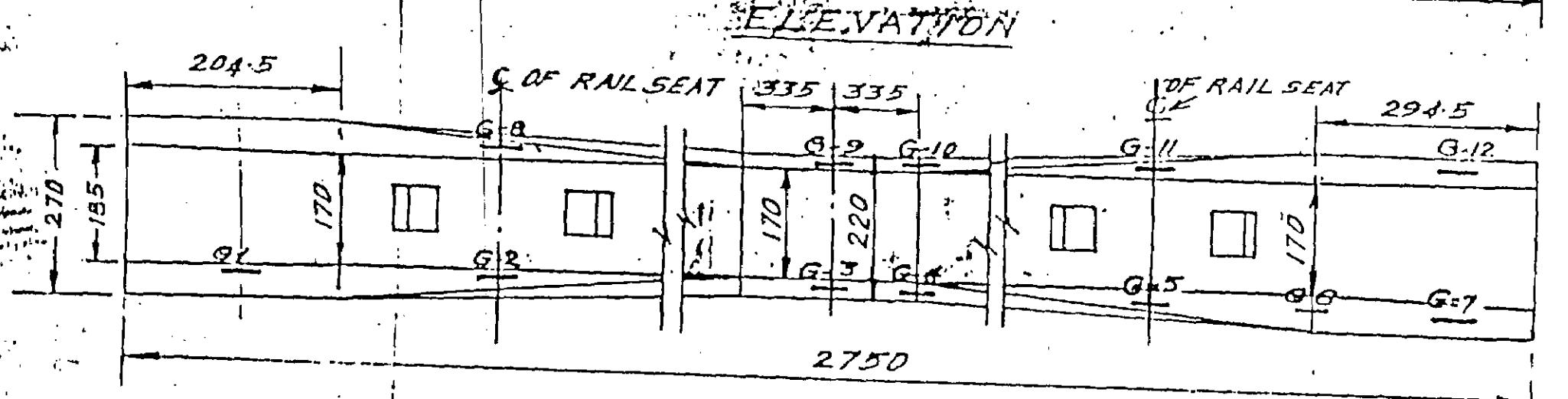
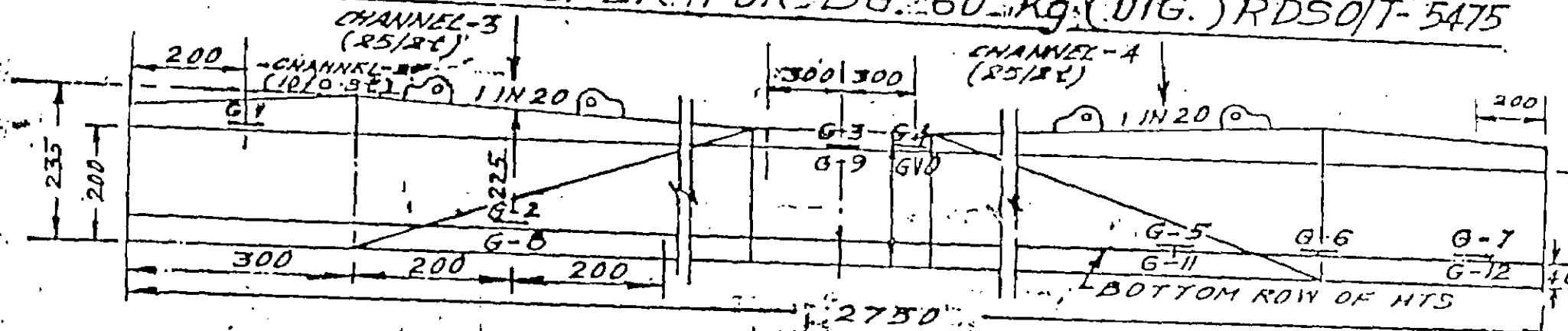


GAUGE LOCATIONS
MAXIMUM & MINIMUM STRESS RANGE AT 1 MILLION CYCLES



GAUGE LOCATIONS
MAXIMUM & MINIMUM STRESS RANGE AT INITIAL STAGE

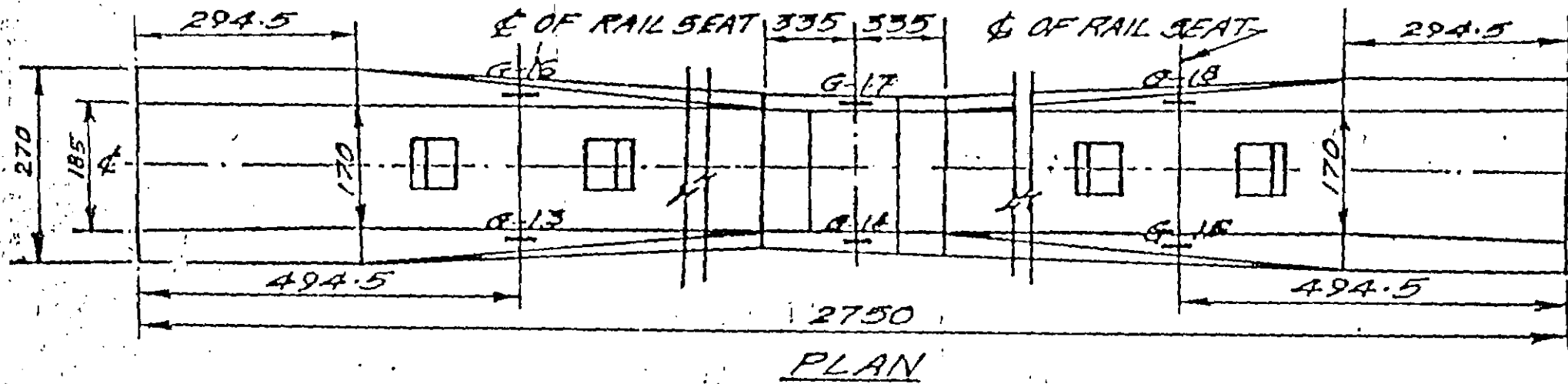
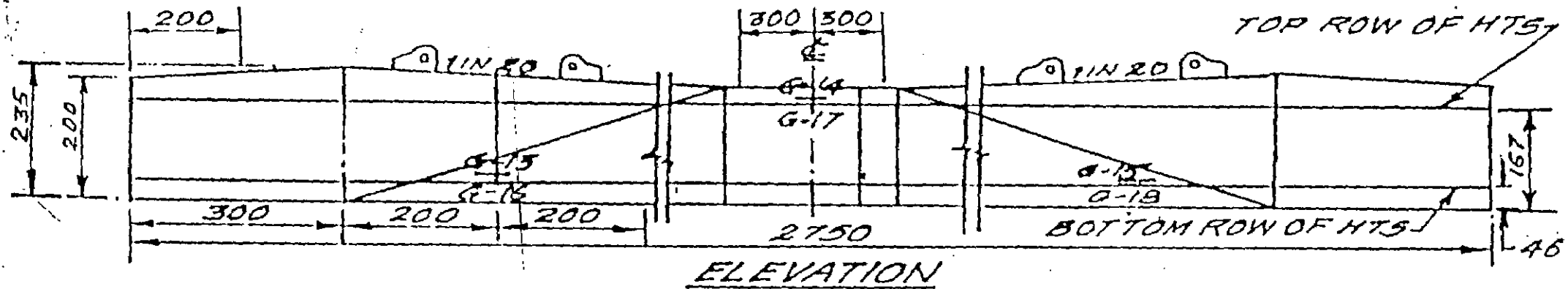
MSC SLEEPER FOR BG: 60 Kg (URG.) RDSO/T-5475



LOCATIONS OF STRAIN GAUGES ON LOADED SLEEPER

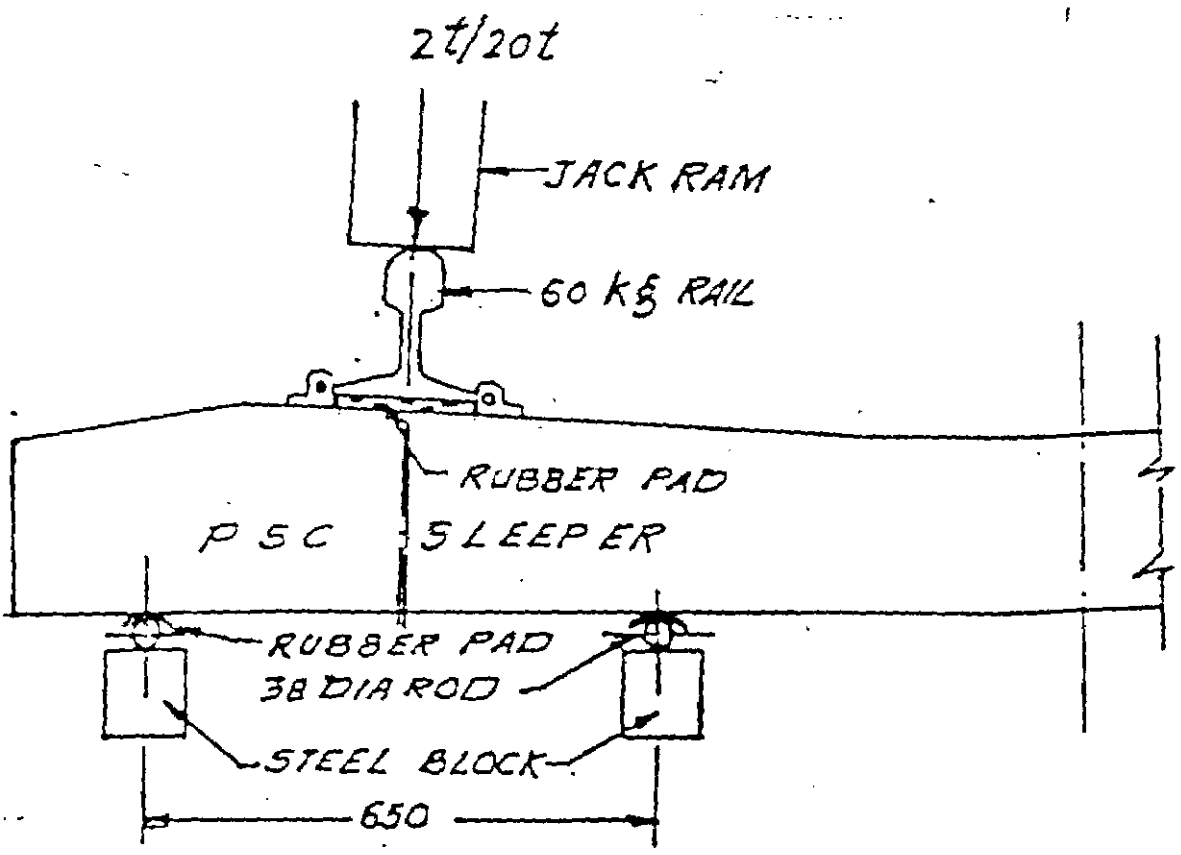
NOTE:-
HEIGHTS OF BOTTOM AND TOP TIERS OF HTS IN CASE OF RDSO/T-2496 ARE 40 AND 160 mm RESPECTIVELY. 09118

PSC SLEEPER FOR B.G. 60 Kg (UIC) RD50/T-5475



LOCATIONS OF STRAIN GAUGES ON SLEEPER ADJACENT TO LOADED SLEEPER

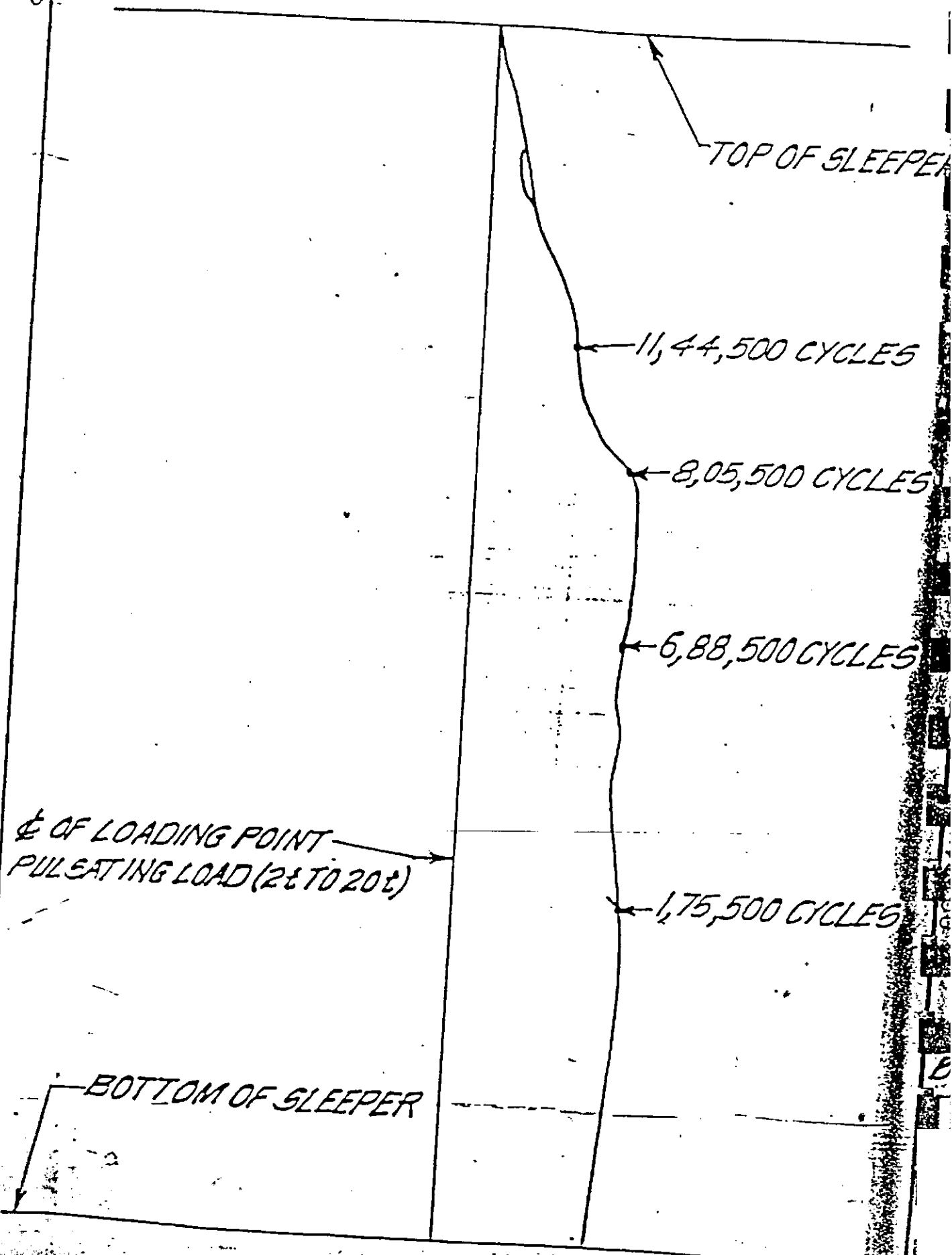
NOTE:
HEIGHT OF BOTTOM & TOP TIERS OF HTS
IN CASE OF RD50/T-24-96 ARE 40 AND
150 MM RESPECTIVELY.



CONVENTIONAL FATIGUE LOADING ON P S C SLEEPER
UNDER PULSATOR (DRG. NO RDSO/T-5475)

09120

SKETCH SHOWING THE FAILURE OF PRESTRESS
CONCRETE SLEEPER TO DRG. NO. T-5475 UNDER
PULSATOR EAST FACE OF THE SLEEPER.



TOP OF SLEEPER

11,44,500 CYCLES

8,05,500 CYCLES

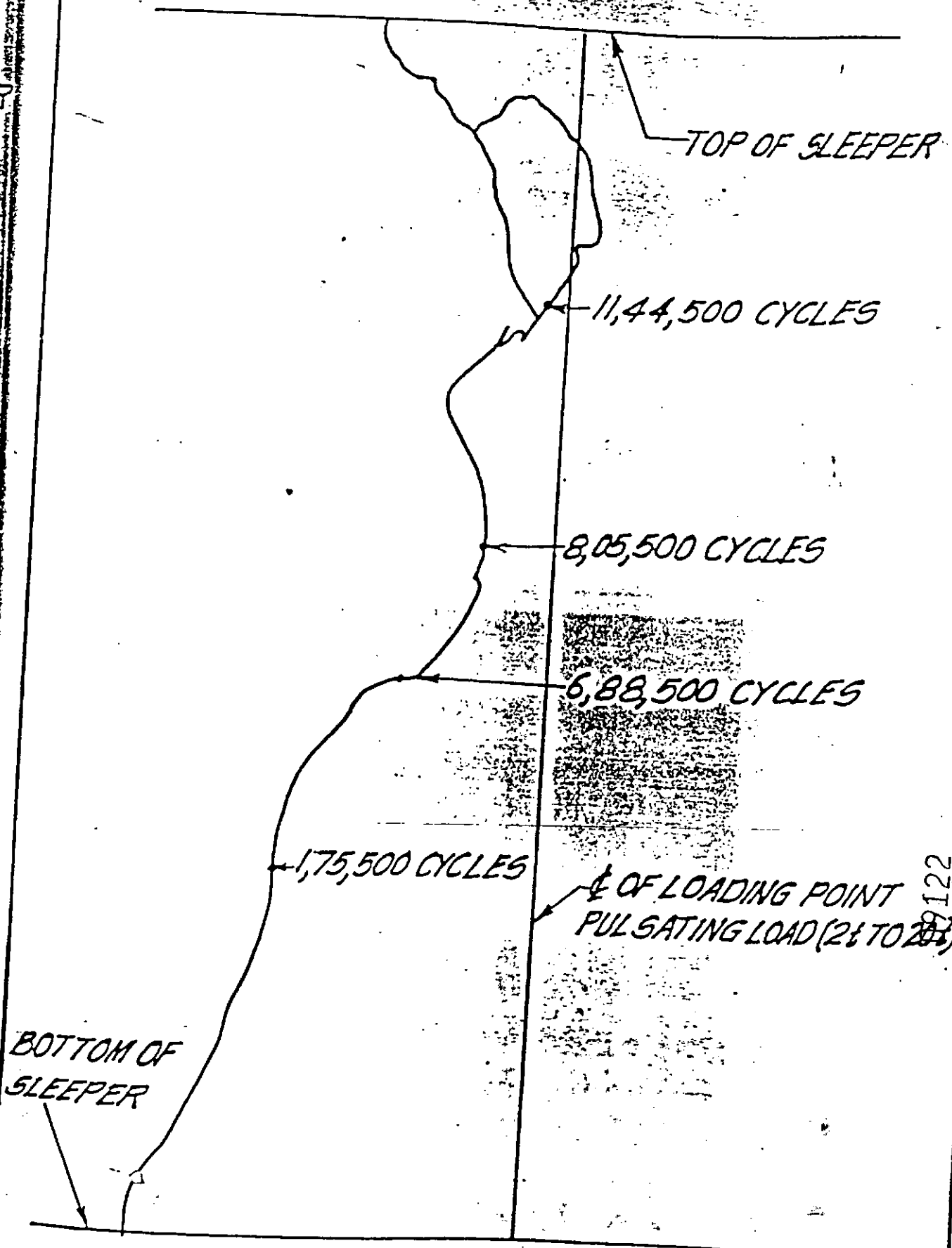
6,88,500 CYCLES

LINE OF LOADING POINT
PULSATING LOAD (20t TO 20t)

1,75,500 CYCLES

BOTTOM OF SLEEPER

SKETCH SHOWING THE FAILURE OF PRESTRESSED CONCRETE SLEEPER TO DRG. NO. T-5475 UNDER PULSATOR. WEST FACE OF THE SLEEPER.



SSSED
IDER

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BOTTOM OF
SLEEPER

TOP OF SLEEPER

11,44,500 CYCLES

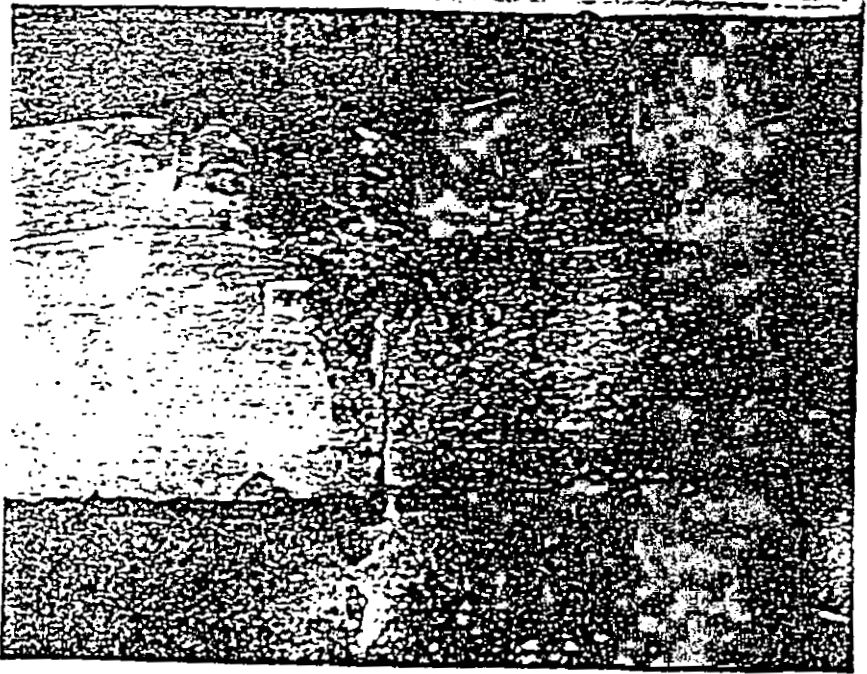
8,05,500 CYCLES

6,88,500 CYCLES

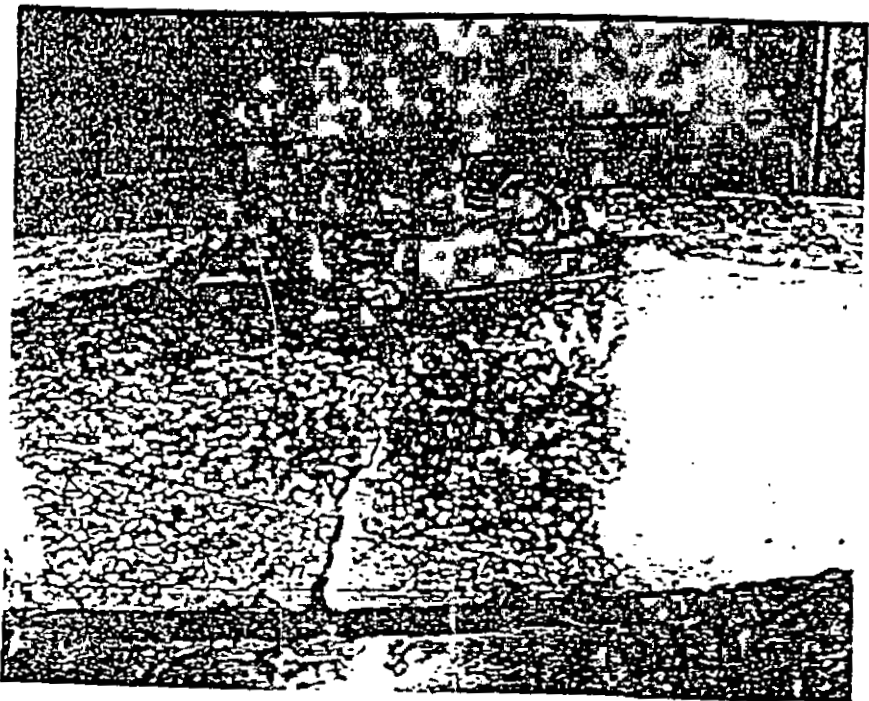
1,75,500 CYCLES

Q OF LOADING POINT
PULSATING LOAD (2 1/2 TO 20 1/2)

27122



Photograph showing the failed sleeper
under Pulsator (East face)



Photograph showing the failed sleeper
under Pulsator (West face)