

ELECTRICAL POWER SYSTEMS

ACTION (Continued)

- c. With two of the above required offsite A.C. circuits inoperable, demonstrate the OPERABILITY of two diesel generators by performing Surveillance Requirement 4.8.1.1.2.a.4 within one hour and at least once per 8 hours thereafter, unless the diesel generators are already operating; restore at least one of the inoperable offsite sources to OPERABLE status within 24 hours or be in at least HOT STANDBY within the next 6 hours. With only one offsite source restored, restore at least two offsite circuits to OPERABLE status within 72 hours from time of initial loss or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.
- d. With two of the above required diesel generators inoperable, demonstrate the OPERABILITY of two offsite A.C. circuits by performing Surveillance Requirement 4.8.1.1.1.a within one hour and at least once per 8 hours thereafter; restore at least one of the inoperable diesel generators to OPERABLE status within 2 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours. Restore at least two diesel generators to OPERABLE status within 72 hours from time of initial loss or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

SURVEILLANCE REQUIREMENTS

4.8.1.1.1 Each of the above required independent circuits between the offsite transmission network and the onsite Class 1E distribution system shall be:

- a. Determined OPERABLE at least once per 7 days by verifying correct breaker alignments, indicated power availability, and
- b. Demonstrated OPERABLE at least once per 18 months during shutdown by transferring (manually and automatically) unit power supply from the normal circuit to the alternate circuit.

4.8.1.1.2 Each diesel generator shall be demonstrated OPERABLE:

- a. In accordance with the frequency specified in Table 4.8-1 on a STAGGERED TEST BASIS by:
 1. Verifying the fuel level in the day fuel tank.
 2. Verifying the fuel level in the fuel storage tank.

ELECTRICAL POWER SYSTEM

SURVEILLANCE REQUIREMENTS (Continued)

3. Verifying the fuel transfer pump can be started and transfers fuel from the storage system to the day tank.
 4. Verifying the diesel starts from ambient condition and accelerates to at least 900 rpm in \leq 15 seconds.
 5. Verifying the generator is synchronized, loaded to 2850 Kw in \leq 60 seconds, and operates for \geq 60 minutes.
 6. Verifying the diesel generator is aligned to provide standby power to the associated emergency busses.
- b. At least once per 92 days by verifying that a sample of diesel fuel from the fuel storage tank obtained in accordance with ASTM-D270-65, is within the acceptable limits specified in Table 1 of ASTM D975-74 when checked for viscosity, water and sediment.
- c. At least once per 18 months during shutdown by:
1. Subjecting the diesel to an inspection in accordance with procedures prepared in conjunction with its manufacturer's recommendations for this class of standby service.
 2. Verifying that the automatic sequence time delay relays are OPERABLE at their setpoint \pm 10% of the elapsed time for each load block.
 3. Verifying the generator capability to reject a load of \geq 596 kw and maintain voltage at 4160 \pm 500 volts and frequency at 60 \pm 3 Hz.
 4. Verifying the generator capability to reject a load of 2850 Kw without exceeding 75% of the difference between nominal speed and the overspeed trip setpoint, or 15% above nominal, whichever is lower.
 5. Simulating a loss of offsite power by itself, and:
 - a) Verifying de-energization of the emergency busses and load shedding from the emergency busses.



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Fairbanks Morse
Engine Division

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FILE NUMBER VTS-985-072282-02R

DATE July 22, 1982

PREPARED BY V.T. Stonehocker

APPROVED

BY

SUBJECT ARKANSAS POWER & LIGHT, ARKANSAS NUCLEAR ONE-UNIT 2
 FAIRBANKS MORSE OPPOSED PISTON 12 CYL 38TD8 1/8 ENGINES
 RATED 2850 KW @ 900RPM - STANDBY POWER SUPPLY SERVICE

REPORT TITLE VOLTAGE DIP AND FREQUENCY DEVIATION PREDICTIONS
 FOR VARIOUS LOADINGS AND LOAD SITUATIONS

GENERAL:

This report covers a computer study of the effect of loads on the 12 cylinder 38TD 8-1/8 x 10 OP diesel engine furnished to Arkansas Power and Light under FM Sales Order (S.O.) 205925. The study includes an analysis of the customer's loads as defined on Bechtel Drawing 6600-2, E-2021, Revision 0. The study also includes investigations of possible loadings that could be allowed on these units while not exceeding the parameters of Nuclear Regulatory Commission Guide Line 1.9, which states: "The diesel generator unit design should be such that at no time during the loading sequence should the frequency and voltage decrease to less than 95 percent of nominal and 75 percent of nominal, respectively" and further; "Frequency should be restored to within 2 percent of nominal, and voltage should be restored to within 10 percent of nominal within 60 percent of each load-sequence time interval." (Under earlier guide lines, recovery was required in 40% of the time interval). [?]

This study consisted of three (3) parts, as follows. The first part consisted of adjusting the computer program and/or its basic input parameters such that the computer predicted output was substantially the same as observed engine-generator set performance (This process is referred to as "normalizing").

The second part consisted of reducing the customer's data to a form acceptable for program input. This consisted primarily of extracting data from the motor speed/torque curve, load table (E-2021) and customer furnished motor data tables, and forming tables of data on computer input coding sheets.

The third phase consisted of inputting various loading combinations into the program and analyzing the data for determining the load acceptance capability of the engine within the limits of the stated guide line.

These three parts will now be discussed in detail.

NORMALIZING COMPUTER PROGRAM

The basic computer program was originally developed and normalized to the Colt-Pielstick (°C2) engine to also fit the observed results obtained with the opposed piston (OP) engine type.

Figure 2 shows the computer output against the observed results after the program and parameter adjustments were completed.

The program was then run for the customer's data with no further adjustments to the basic parameters.

Rev. 1 - SKVA for 480V motors corrected to 480 volt (was originally calculated on 460 volt).

Numerous corrections per AP&L letter of Aug. 17, 1982

Addition on page 5 of discussion of effect of overlapping of loads.

Addition of new Figure 2, Figures 3&4 renumbered from 2&3.

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ANALYSIS OF CUSTOMER'S LOAD TABLE

The load tables were analyzed and loadings regrouped into time slots for each of the load conditions, i.e. Loss of Coolant Accident (LOCA), Main Steam Line Rupture (MSLR), and Loss of Offsite Power (LOP). This data is summarized in Table I. This data forms the basis for the load step inputs (Coding Sheet 2) for the program (See Appendix A).

Where motor torque data was available, generally in the form of the speed vs torque curve, this data was reduced to a tabular form at 5% speed increments. This is included in Appendix A (on Coding Sheet No. 3).

Where motor data was not available or where motors were of a small rating, a "standard motor" was assumed. A standard motor is one having a two (2) second acceleration time and having a load profile as follows:

		"Standard Motor"	<u>Loading</u>	
<u>Time-Seconds</u>				
0			1.2 *MKW	(120%)
.5			1.2 *MKW	{120%}
1.0			1.3 *MKW	{130%}
1.5			1.6 *MKW	{160%}
1.7			2.0 *MKW	{200%}
1.8			2.5 *MKW	{250%}
1.9			2.5 *MKW	{250%}
2.00			1.0 *MKW	(100%)

Where MKW = Motor HP * .746 / .9 and the motor is assumed to take 2 seconds to obtain rated speed. This table results in a degree of severity of 148%, which is a number in the range derived from the analysis of several known motors.

$$\text{Degree of Severity} = \frac{\text{Mean KW during acceleration} * 100}{\text{KW of motor at rated output}}$$

To use the "Standard motor", it is only necessary to define the motor size MHP2, and set FLG02 at 2. The program takes care of all calculations otherwise necessary for its purposes.

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Where a small motor is started simultaneously with a large motor, the small motor HP is added to the large motor HP and then this combined HP (KW) is used in the calculation using the speed-torque data for the large motor. [This has been analyzed to be the worst case condition. If the small motor were to pull in at a time differing from the large motor, either earlier or later, the net effect would be less severe]. "Standard" motors are assumed where indicated in the following table.

Step	Time/Sec	LOCA	MOTORS			Notes
			HP	OR	STD	
1	0	Std(140)	MSLR		LOP	
2	4.5 or 5.5	800	Std(135)		Std(81/181)	
3	10	600	800		800	
4	15	450/500	600		-	
5	20	150(2x75)	450/500		-	1
6	25	455	150		-	
7	50	105	455		-	2
8	60	105	105		105	3
9	70	Std(50/100)	105		105	3
10	80	Std(41/37)	Std(50/100)		Std(40/90)	
11	90	Std(25)	Std(41/37)		Std(36/32)	
12	>120	118/98	Std(25)	Std(635/35)	Std(610/10)	
			Std(97)	Std(97)	Std(107)	

- Notes 1. 500 HP was used in all computations. (Unit 1/Unit 2)
 2. 450 HP motor S/T curve at 455 HP
 3. 100 HP motor S/T curve at 105 HP

Where the locked rotor current was given, inrush power (SKVA) was calculated on the basis of the locked rotor current using
 $SKVA = ILR * E * \sqrt{3} / 1000.$

For all others, SKVA was assumed
 $SKVA = 6.5 * HP \text{ rating.}$
 $(1 \text{ KVA} / \text{HP}).$

The running load (KW-R Load in Table 1) of motor was taken from Drawing E-2021.
 Where that was not given, it was assumed to equal
 $MKWS = HP * .746 / .9$ (90% motor efficiency assumed).



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Inertia of the motors (WR^2) was generally not given. A value was assumed using a formula developed from the values of several known motors. Examination of the first computer runs indicated too short an acceleration rate on some motors. The WR^2 value was then adjusted to a value that would give a motor acceleration time a small amount (10%) larger than the values for acceleration noted in the motor data.

All of this data is summarized on Table I and/or on the coding sheets (Appendix A).

After examining the data, it was decided to run the program for the following conditions:

- 1) Unit 2 under LOCA conditions because of the 100 HP loading at Step 9. Otherwise, this is the same as Unit 1 LOCA, and very similar results would be expected.
- 2) Unit 1 under MSLR conditions because of the 635 HP loading at Step 11. Otherwise, this is the same as Unit 2 MSLR and very similar results would be expected.
- 3) Unit 1 under LOP conditions because of the 610 HP loading at Step 11. Otherwise, this is the same as Unit 2 LOP and very similar results would be expected.

Tables II, III and IV summarize the results for the conditions indicated above.

It should be noted that none of the loadings analyzed resulted in the unit having a frequency deviation large enough to exceed 2% (98% nominal value). The 800 and 600 HP motors do result in a significant voltage dip but not exceeding the guide line value.

A plotting of the frequency and voltage versus time curves is possible from the data derived from the computer printout, but it was not deemed appropriate to do so for the small values noted. It should be noted that loads that result in a maximum frequency deviation of less than .25% be disregarded entirely as they are smaller than the accuracy of the process of calculation. The computer printouts are included as appendix B.

The frequency recovers in a short enough time that there should be no problem with these units, in regard to meeting the ~~NCR~~ parameters as stated in the first paragraph of this report. None of the loads analyzed resulted in a frequency deviation greater than 2% (deviation to 98% of nominal), and therefore the frequency recovery is effectively "zero" in all cases. The voltage recovery is also very short (generally less than 1/2 second) and therefore poses no problem.



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Of special concern to the customer, was the case where, due to time drift, setability or repeatability of the sequencing control relays, motors of one step might overlap or coincide with the start of motors from the next step. The customer had indicated that timer accuracy was subject to an error or variance of plus or minus ten percent (+/- 10%). [Letter GE-82-35 dtd Apr 5, 1982].

Figure 2 shows, in bar chart form, the period of time during which the loads of each step may occur (within +/- 10% of the prescribed time). It may be noted that there is no overlap on loadings before Step 7, and there is the possibility of overlap on all steps beyond Step 7 (except step 11 and 12 - step 12 is manual loads, and is not considered a viable case).

Since there are a great many possibilities to consider in this overlapping situation, it was decided to analyze only the worst case conditions, and only those where the resulting loading would be great. The worst case condition occurs when there is coincidence of loadings. Every other condition will be less severe. It has been observed from actual test results, that additional loadings added to a unit after the point that the governor and voltage regulator have been fully turned on, are accepted by the engine with little additional effect. (The rate of recovery is reduced and the time of recovery is extended somewhat, but the maximum deviations are not significantly altered.)

Table V gives the detail of the loads for these overlapping or coincidental situations. While there is not the possibility of an exact coincidence for overlapping of the loads of Steps 5 and 6, these loads are close enough to have some effect on each other. The worst case condition of coincidence was therefore assumed for this step as well. Since the worst case conditions for coincidence of Steps 7 and 8, or 8 and 9, or 9 and 10, or 10 and 11 for the LOCA case, still resulted in very small loadings, these were not specifically analyzed. The loadings shown in the boxes were analyzed by inputting the appropriate data to the computer program. The results for these loads are shown in Table VI.

No problems are evident with these loads that would indicate the unit's inability to perform within the parameters of the NRC guideline.



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ENGINE CAPABILITYVoltage Capability

The voltage acts independently of the frequency for small (within 10%) deviations of frequency, and is primarily influenced only by the inrush of current to which the machine is subjected. The amount of voltage dip is also not significantly influenced by the load on the unit. (However, the rate of recovery of the voltage is influenced by the load on the unit). Therefore, the voltage dip capability can be calculated directly if the amount of SKVA is known. For a given voltage dip allowable, the permissible SKVA can be calculated. The formulae are as follows:

$$ED = \text{Voltage Dip} = \frac{100}{1 + KVA * \frac{100}{SKVA * CX''d}}$$

$$SKVA = \frac{KVA * 100}{\frac{100}{ED} - 1 * CX''d}$$

Where SKVA = Inrush power = $I_{LR} * V * \sqrt{3} / 1000$, or $6.5 * HP$

KVA = Generator Rated KVA

$CX''d = (X'd_u - X''d_u) * 2/3 + X''d$

Where $X'd_u$ = Transient reactance

$X''d_u$ = Subtransient reactance.

Frequency/Load Capability

A series of computations were run wherein the base load level was held constant for various levels of loads added. The results were tabulated (See Table V - Appendix B) and the values were plotted and interpolated to determine the maximum load that could be added to a unit already loaded to some base value without exceeding the 5% frequency deviation (95% of nominal value). The results of these tabulations are shown in Figures 3 and 4.

Figure 3 shows the load that can be added to a base load without exceeding 5% frequency deviation, regardless of the recovery time (Note: Recovery time is indicated along the top edge of the curved line). Any loading within the enclosed area is acceptable.

Figure 4 shows the loads acceptable if there is a restriction of time involved. Note that this may result in less capability than the 5% frequency deviation (shown by the dashed line).

None of the loads in the customer's load table approached these load restrictions.



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In using this information to estimate the size of future loads, when those loads involve motors, the following technique should be used:

1. Calculate the motor KW = Motor HP * .746/.9 and sum all motors for that step.
2. Multiply motor HP by 1.5 (typical severity factor), particularly if the motors are known to require more than 1 to 1.5 second to accelerate to speed.
3. Add any other (KW) load to the motor loads and use this as the "Load Addition" for Figure 3 or 4.

NOTE: In checking this report and reviewing the inputs used for No Load Field Voltage, Full Load Field Voltage and Maximum Field Voltage (lines 6, 7 & 8 of Appendix B1) (also see Coding Sheets - Appendix A1), a .5 multiplier was used. However, because these voltages are converted into per unit values (using Full Load Field Volts as a base) in their usage throughout this computer program, this .5 multiplier cancelled out in the process of conversion to per unit values.

VERIFICATION

I have reviewed the equations on which this report is based and verified the inputs against those tabulated on Bechtel dwg. E-2021 Rev. 0, and thereby confirm that this report is applicable and correct.

Romeo T. Calud
R. T. Calud
9/27/82



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TABLE I

LOAD STEP SUMMARIES

Load Step 1 - Time = 0	HP	KW	SKVA	KW R LOAD	UNIT NO. 1	UNIT NO. 2				
					LOCA	MSLR	LOP	LOCA	MSLR	LOP
Mtr OP Valves (10 Sec ACC)	100 (80)**	83 (66)	650† (520)	83 (66)	X	X	-	X	X	-
Nucl Stm Sup Sys Inst	(40)	33	-		Xr	Xr	Xr	Xr	Xr	Xr
120V Reg Inst Bus	(27)	22	-		Xr	Xr	Xr	Xr	Xr	Xr
Battery Chargers	(200)	166	-		Xr	Xr	Xr	Xr	Xr	Xr
Control Rm Emerg Air Filt Fan	5	4	33†	4	X	-	-	X	-	-
•Turb Turn Gr Oil Pur [2 only]	40	33	241	33	-	-	-	-	-	X
•Turb Turn Gr [2 only]	60	57/39	382/217	50	-	-	-	-	-	X
•Oil Lift Pump (3x5)	15	12	115	12	-	-	X	-	-	X
•Main FW Pump Turb Turn Gr	2	2	21	2	-	-	X	-	-	X
•Main FW Pump (AC LO Pump)	20	17	130†	17	-	-	X	-	-	X
•Computer Inverter (40 KVA)	(30)	25	(332)		Xr	Xr	Xr	Xr	Xr	Xr
Diesel Gen Start Air Comp (2x5)	10	8.2	70	8.2	X	X	X	X	X	X
Reactor Clnt Pump Lift Pumps	8.6	7	56†	7	-	-	X	-	-	X
Swgr Rm Exh Fans	25	21	149	21	X	X	X	X	X	X
			Total HP Motors	140	135	81	140	135	181	
			AKW Loads	246	246	246	246	246	246	
			SKVA	902	869	541	902	869	1164	
			Running KW	116	112	67	116	112	150	

$$SKVA = LRA * V * \sqrt{3} \text{ or } 6.5 * HP†$$

$$KW = HP * .746/.9$$

• Non-IE Loads

* Assumption

† Values calculated by 6.5 * HP are indicated †

KW R Load = KW Running Load - Taken from Dwg. #-2021.

Where not given, motor KW is used.

Numbers in parenthesis in HP columns given as HP in motor data tables,
assumed to be KW loading - KW = .746 X HP/.9

** Notes with motor data indicates 80 1HP motors.

Xr considered as resistive load only.



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TABLE I - (CONT'D)

LOAD STEP SUMMARIES

	HP	KW	SKVA	R LOAD	UNIT NO. 1			UNIT NO. 2		
					LOCA	MSLR	LOP	LOCA	MSLR	LOP
Step 2 - Time = 4.5 or 5.5 Seconds					X	X	X	X	X	X
Service Water Pump										
	800	663	4921	622						
Step 3 - Time = 10 Sec										
					X	X	-	X	X	-
High Press Safety Inj Pump										
	600	497	3531	390						
Step 4 - Time = 15 Sec										
Diesel										
Low Press Safety Inj Pump										
Unit 1	450	373	2623	352	X		X	-	-	-
			166			X				
Diesel	500**	414	2954	352	-	-	-	X		X
Unit 2			166					X		-
Step 5 - Time = 20 Sec										
Containment Cl Fans (2x75)										
	150	124.3	1044	124	X	X	-	X	X	-
Step 6 - Time = 25 Sec										
Cont Spray Pumps										
	450	373	2695	373	X	X	-	X	X	-
NaOH Add Pump										
Totals	5	4	35	4	X	X	-	X	X	-
	455	377	2730	377						
Steps 7 & 8 @ 50 Sec & 60 Sec										
Charging Pumps										
	100	82.8	499	61	X	X	X	X	X	X
Charging Pump Rm Unit Clr										
Totals	5	4	37.4	4	X	X	X	X	X	X
	105	87	536	65						

Use L/T vs SPD for CP @ 105 HP.

** Use in all computations, all units.



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LOAD STEP SUMMARIES

Step 9 - Time = 70 Sec	HP	KW	SKVA	R LOAD	UNIT NO. 1			UNIT NO. 2		
					LOCA	MSLR	LOP	LOCA	MSLR	LOP
Diesel 2 only					-	-	-	X	X	X
Boric Acid Makeup Pump (2x25)	50	41.4	284	41.4						
Emerg DG Exh Fan (2x15)	30	25	176	25	X	X	X	X	X	X
Intk Struct Exh Fan	10	8.3	67	8.3	X	X	X	X	X	X
Pent Rm Exh Fan	10	8.3	65†	8.3	X	X	-	X	X	-
			Total HP		50	50	40	100	100	90
			SKVA		308	308	243	592	592	527
			R Load		42	42	33	83	83	75

Step 10 - Time = 80 Sec

Shutdown Ht Exch Rm U Clr (2x10)	20	16.6	133	16.6	X	X	X	X	X	X
Swgr Rm Unt Clrs (2x5)	10	8.3	75	8.3	X	X	X	X	X	X
HPSI Pump Rm U Clr	5	4.1	36	4.1	X	X	-	X	X	-
Aux Bldg Elec Rm U Clr [1]	5	4.1	37	4.1	X	X	X	-	-	-
Aux Bldg Elec Rm U Clr [2]	1	1	6.9	1	-	-	-	X	X	X
Boric Acid M.U. Pump Rm U Clr	1	1	12	1	X	X	X	X	X	X
			Total HP		42	42	37	37	37	32
			SKVA		288	281	254	252	252	218
			R Load		35	35	31	31	31	27

Step 11 - Time = 90 Sec

Emerg FW Pump [Diesel 1 only]	600	497	3516	435	-	X	X	-	-	-
Emerg FW Pump Rm Clr	10	8.3	67	8.3	-	X	X	-	X	X
Elec Equip Rm Exh Fan	25	20.7	149	20.7	X	X	-	X	X	-
			Total HP		25	635	610	25	35	10
			SKVA		149	3732	3583	149	216	67
			R Load		21	464	443	21	29	8



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TABLE I - (CONT'D)

LOAD STEP SUMMARIES

Step 12 & Beyond - > 2 Min	HP	KW	SKVA	R LOAD	UNIT NO. 1			UNIT NO. 2		
					LOCA	MSLR	LOP	LOCA	MSLR	LOP
Press Prop Htrs (200 HP)	(200)	166	-	-	-	-	Xr	-	-	Xr
Hydrogen Recomb (100 HP)	(100)	83	-	-	Xr	-	-	Xr	-	-
Boric Acid Tank (Pipe Htrs(50 HP)	(50)	41	-	-	-	-	Xr	-	-	Xr
Contrl Rm AC Comp	50	41.4	301	41.4	X	X	X	X	X	X
Cavity Clg Fan	40	33.2	283	4	-	-	X	-	-	X
Cont Bldg Recirc Fan (2x15)	30	24.9	193	24.9	X	X	-	X	X	-
Control Rm AC Unit	10	8.2	67	8.2	X	X	X	X	X	X
Hydr Purge Sup & Exh Fans (2x10)	20	16.4	135	16.4	X	-	-	-	-	-
Elec Rm Unit Clr	3	2.5	19.5†	2.5	X	X	X	X	X	X
Battery Rm Exh Fan	2	1.7	18.3	1.7	X	X	X	X	X	X
Diesel Oil Trans Pump	2	1.7	13.0†	1.7	X	X	X	X	X	X
Hyd Purge Sys Seal Wtr Pump	1	1	11	1	X	-	-	X	-	-
			Total HP	118	97	107	98	97	107	
			SKVA	758	612	702	623	612	702	
			R Load	98	80	60	81	80	60	
			AKW	83	Ø	207	83	Ø	207	

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TABLE II

SUMMARY OF LOAD TABLE - LOCA CONDITIONS

UNIT 2 RESULTS GIVEN

Step No.	Time*	Sec	UNITS											
			1	2	3	4	5	6	7	8	9	10	11	12
			0	4.5(5.5)	10	15	20	25	50	60	70	80	90	120
Existing Load	KW	0	362	984	1292	1644	1768	2145	2210	2275	2316(2358)	2350(2389)	2371(2410)	
Added KW Load	KW	246	0	[−83]	0	0	0	0	0	0	?	0	83	
Motor HP	HP	140	800	600	450(500)	150	455	105	105	50(100)	42(37)	25	118(98)	
KW	KW	116	663	497	373(414)	124	377	87	87	41(83)	35(31)	21	98(81)	
Running KW	KW	116	622	390	352	124	377	65	65	41(83)	35(31)	21	98(81)	
Final Loading	KW	362	984	1292	1644	1768	2145	2210	2275	2316(2358)	2350(2389)	2371(2410)	2552(2574)	
SKVA	SKVA	902	4921	3531	2623(2954)	1044	2730	536	536	308(592)	288(252)	149	758(623)	
Corrected SKVA	CSKVA	965	4921	3531	2623(2954)	1044	2730	536	536	308(592)	288(252)	143	773(639)	
Results **														
Voltage Dip	%	4.95	21.0	16.0	13.8	5.34	12.8	2.81	2.81	3.10	1.34	.80	3.34	
Time @ Max Dip	Sec	.03	.13	.10	.09	.03	.08	.02	.02	.02	.01	.005	.02	
Time @ 90%	Sec	-	.33	.21	.15	-	.13	-	-	-	-	-	-	
Time @ recov.	Sec	.10	.50	.36	.31	.11	.29	.06	.06	.06	.03	.02	.07	
Frequency Dip	%	.57	1.22	.76	.78	.50	.72	.33	.33	.17	.10	.09	.27	
Time @ Max Dip	Sec	.44	.40	.41	.42	.51	.42	.58	.58	.59	.95	1.22	.05	
Time @ 90%	Sec	-	-	-	-	-	-	-	-	-	-	-	-	
Time @ Recov.	Sec	1.26	1.09	.91	1.05	.72	.95	.69	.69	.64	.97	1.24	.63	

* Time from initiation of start signal (+/- 10%). (Numbers in parenthesis are for Unit 2.)

** Time from point of step change.

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TABLE III

SUMMARY OF LOAD TABLE - MSLR CONDITIONS

UNIT 1 RESULTS GIVEN

Step No.	Time*	Sec	UNITS											
			1	2	3	4	5	6	7	8	9	10	11	12
Existing Load	KW		0	358	980	1287	1453	1577	1954	2019	2084	2126(2167)	2161(2198)	2625(2227)
Added KW Load	KW	246	0	[-83]	0	0	0	0	0	0	0	0	0	0
Motor HP	HP	135	800	600	450(500)	150	455	105	105	50(100)	42(37)	635(35)	97	
KW	KW	112	663	497	373(414)	124	377	87	87	42(83)	35(31)	526(29)	80	
Running KW	KW	112	622	390	166	124	377	65	65	42(83)	35(31)	464(29)	80	
Final Loading	KW	358	980	1287	1453	1577	1954	2019	2084	2126(2167)	2161(2198)	2625(2227)	2705(2307)	
SKVA	SKVA	869	4921	3531	2623(2954)	1044	2730	536	536	308(592)	288(252)	3732(216)	612	
Corrected SKVA	CSKVA	953	4921	3531	2623(2954)	1044	2730	536	536	308(592)	288(252)	3732(216)	612	

Results**

Voltage Dip	%	4.80	21.0	16.0	13.8	5.34	12.8	2.80	2.80	1.64	1.53	16.8	3.20
Time @ Max Dip	Sec	.03	.13	.10	.09	.03	.08	.02	.02	.01	.01	.11	.02
Time @ 90%	Sec	-	.33	.21	.15	-	.13	-	-	-	-	.23	-
Time @ recov.	Sec	.10	.50	.36	.31	.11	.29	.06	.06	.03	.03	.39	.07

Frequency Dip	%	.57	1.22	.76	.78	.50	.72	.33	.33	.12	.11	.69	.16
Time @ Max Dip	Sec	.44	.40	.41	.42	.51	.42	.58	.58	.80	.88	.59	.52
Time @ 90%	Sec	-	-	-	-	-	-	-	-	-	-	-	-
Time @ Recov.	Sec	1.26	1.09	.91	1.05	.72	.96	.69	.69	.84	.91	.83	.68

* Time from initiation of start signal (+/- 10%). (Numbers in parenthesis are for Unit 2.)

** Time from point of step change.



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TABLE IV

SUMMARY OF LOAD TABLE - LOP CONDITIONS

UNIT 1 RESULTS GIVEN

Step No.	Time*	Sec	UNITS								
			1	2	3	4	5	6	7	8	9
Existing Load	KW		0	313(396)	935(1018)	1287(1370)	1352(1435)	1417(1500)	1450(1575)	1481(1602)	1924(1610)
Added KW Load	KW	246	0	0	0	0	0	0	0	0	207
Motor HP	HP	81(181)	800	450(500)	105	105	40(90)	37(32)	610(10)	107	
KW	KW	67(150)	663	373(414)	87	87	33(75)	31(27)	443(8)	60	
Running KW	KW	67(150)	622	352	65	65	33(75)	31(27)	443(8)	60	
Final Loading	KW	313(396)	935(1018)	1287(1370)	1352(1435)	1417(1500)	1450(1575)	1481(1602)	1924(1610)	2191(1877)	

SKVA	SKVA	541(1164)	4921	2623(2954)	536	536	243(57)	254(218)	3583(67)	702
Corrected SKVA	CSKVA	621(1220)	4921	2623(2954)	536	536	243(527)	254(218)	3583(67)	731

Results**

Voltage Dip	%	3.25	21.0	13.8	2.8	2.8	1.77	1.35	16.2	3.80
Time @ Max Dip	Sec	.02	.13	.09	.02	.02	.01	.01	.10	.02
Time @ 90%	Sec	-	.33	.15	-	-	-	-	.21	-
Time @ recov.	Sec	.07	.50	.31	.06	.06	.03	.03	.37	.08

Frequency Dip	%	.50	1.22	.78	.34	.34	.11	.10	.68	.42
Time @ Max Dip	Sec	.45	.40	.42	.57	.57	.89	.94	.41	.47
Time @ 90%	Sec	-	-	-	-	-	-	-	-	-
Time @ Recov.	Sec	1.30	1.09	1.01	.69	.69	.93	.95	.86	.64

* Time from initiation of start signal.

(Numbers in parenthesis are for unit 2.)

** Time from point of step change.



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TABLE V

TIMES OF CONCURRENT LOADINGS OR SIGNIFICANT OVERLAP
(Worst Case Condition Occurs on Concurrency of Loads)

<u>OVERLAPS</u>	<u>LOCA</u>	<u>MSLR</u>	<u>LOOP</u>
Steps 5&6 20-25 Sec (.5 Sec GAP)	EXLD 1644 KW MHP 150 + 455 = 605 HP MLKW 124 + 377 = 501 KW SKVA 1001 + 2728 = 3729	1453 Same as LOCA	N/A
Steps 7&8 50-60 Sec (1 Sec DL)	EXLD 2145 MHP 105+105=210 MLKW 65+65=130 SKVA 613+613=1226	1954 Same as LOCA	1287 Same as LOCA
Steps 8&9 60-70 Sec (3 Sec DL)	EXLD 2210 MHP 105+50(100)=155(205) MLKW 65+41(8)=106(148) SKVA 613+299(571)=912(1184)	Same as LOCA	105+40(90)=145(190) 65+33(75)=98(140) 613+234(506)=849(1119)
Steps 9&10 70-80 Sec (5 Sec DL)	EXLD 2275 MHP 50(100)+41(37)=91(137) MLKW 41(83)+34(31)=75(114) SKVA 299(571)+281(246)=580(817)	2084 Same as LOCA	1417(1500) 40(90)+36(32)=76(122) 33(75)+30(27)=66(102) 234(506)+248(212)=482(718)
Steps 10&11 80-90 Sec (7 Sec DL)	EXLD 2316(2358) MHP 41(37)+25=66(62) MLKW 34(31)+21=55(52) SKVA 281(246)+143=424(389)	2125(2167) 41(37)+635(35)=676(72) 34(31)+464(29)=498(60) 282(246)+3722(206)=4004(452)	1450(1575) 36(32)+610(10)=646(42) 30(27)+443(8)=473(35) 248(212)+3580(64)=3828(276)

EXLD = Existing Load

MHP = Motor Horsepower Ratings

MLKW = Motor Running Load - KW

SKVA = Inrush KVA



UNIT INDUSTRIES

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TABLE VI

SPECIAL CASES - OVERLAPPING OR CONCURRENT LOADINGS

		LOCA	MSLR	LOOP
Steps Merged		586	10311	7-8
Time Range	Sec	20-25	80-90	80-90
Overlap/Gap	Sec	.5 Gap	7 Sec Overlap	7 Sec Overlap
Existing Load		1644	2125	1450
Motor HP		605	676	646
Running Load		501	498	473
CSKVA Inrush		3729	4004	3828

Results**

Voltage Dip %		16.8	17.8	17.1
Time @ Max Dip Sec		.11	.11	.11
Time @ 90% Rec. Sec		.23	.25	.24
Time @ recov. Sec		.39	.42	.40
Frequency Dip %		1.22	.90	.85
Time @ Max Dip Sec		.41	.40	.41
Time @ 90% Rec. Sec		-	-	-
Time @ Recov. Sec		1.46	.91	.93



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TABLE VII

%	Base Load	Added Load	%	Net Load	%	Max. Dev.	Added Load To			
							TDMX	98%	100%	5% Limit
0	0	2137.5	75	2137.5	75	3.82	1.3	2.57	3.14	
0	0	2280	80	2280	80	4.52	1.5	<u>3.03</u>	3.57	79.5
0	0	2423	85	2423	85	<u>5.35</u>	1.8	3.55	4.16	83
0	0	2565	90	2565	90	6.31	2.0	4.31	5.03	
0	0	2708	95	2708	95	7.39	2.3	5.54	6.41	
10	285	2138	75	2423	85	4.76	1.8	<u>3.40</u>	4.02	71.5
	285	2280	80	2565	90	<u>5.71</u>	2.0	4.12	4.84	76.3
	285	2423	85	2708	95	6.81	2.3	5.26	6.14	
	285	2565	90	2850	100	8.06	2.6	7.44	8.54	
20	570	1853	65	2423	85	3.83	1.6	<u>3.00</u>	3.64	65
	1995	70	2565	90	4.70	1.9	<u>3.63</u>	4.35		
	2138	75	2708	95	<u>5.73</u>	2.2	4.59	5.46	71.5	
	2280	80	2850	100	6.93	2.5	6.35	7.46		
25	712.5	712.5	25	1425	50	1.01	.42	-	1.06	
		1425	50	2137.5	75	2.16	1.9	1.31	2.43	
		1568	55	2280	80	2.66	1.2	2.03	2.90	
		1710	60	2423	85	3.31	1.5	2.68	3.39	
		1853	65	2565	90	4.12	1.8	<u>3.32</u>	4.04	62.5
		1995	70	2708	95	<u>509</u>	2.1	4.17	5.04	69.5
		2137.5	75	2850	100	6.23	2.40	5.70	6.80	
30	855	1566	55	2421	85	2.79	1.3	2.25	3.10	
	1710	60	2565	90	3.52	1.6	<u>2.95</u>	3.70		
	1853	65	2708	95	4.40	1.9	<u>3.71</u>	4.58	60.3	
	1995	70	2850	100	<u>5.47</u>	2.30	5.01	6.12	68	
40	1140	1425	50	2565	90	2.38	1.2	1.88	2.94	
	1568	55	2708	95	3.05	1.5	2.71	3.61	56.6	
	1710	60	2850	100	3.90	1.9	<u>3.60</u>	4.71		
	1853	65	2993	105	4.95	2.3	5.43	6.94		
	1995	70	3135	110	<u>6.22</u>	2.7	12.24	14.62	65.2	
50	1425	1425	50	2850	100	2.48	1.3	2.16	3.35	54.
	1565	55	2993	105	3.23	1.7	<u>3.23</u>	4.74		
	1710	60	3135	110	4.21	2.2	<u>6.06</u>	8.44	est 63	
	1853	65	3278	115					13% @ 20 sec not recovering	
	1995	70	3420	120(Max)					20% @ 20 sec not recovering	

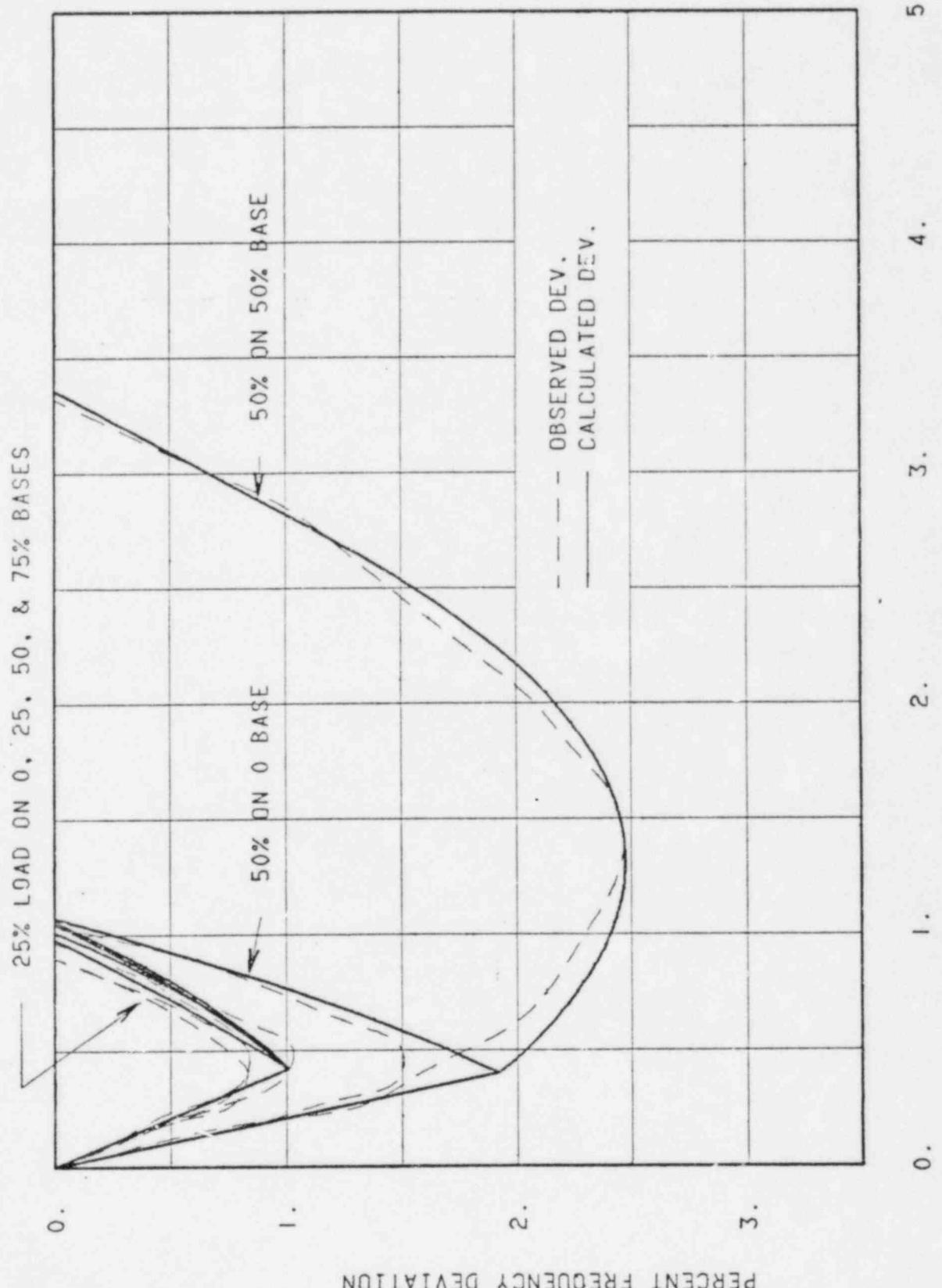


FIGURE I. OP ENGINE BASIC DATA CURVE FIT. 2850 KW @ 900 RPM. 34572 WRSQ.

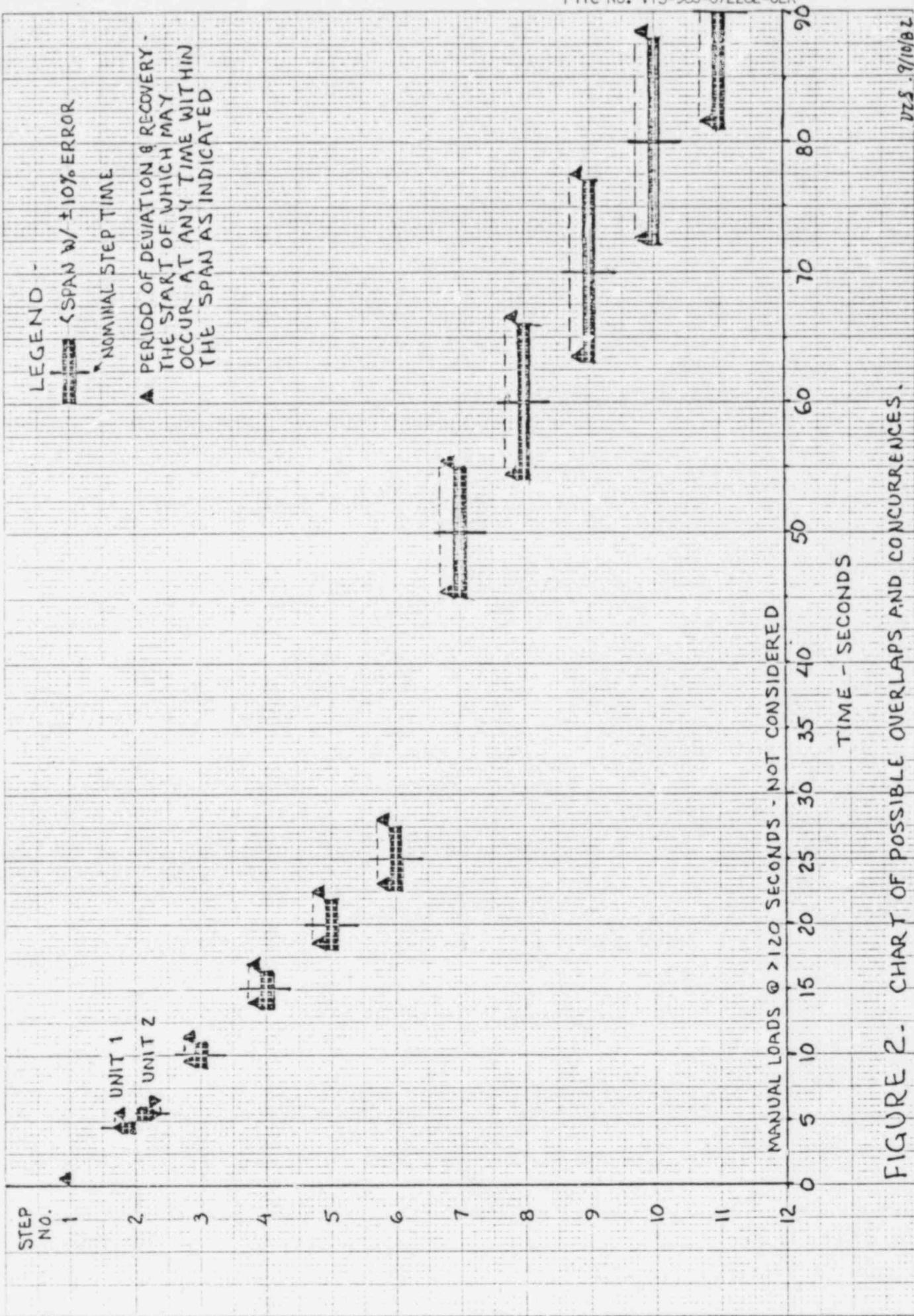


FIGURE 2. CHART OF POSSIBLE OVERLAPS AND CONCURRENCES.

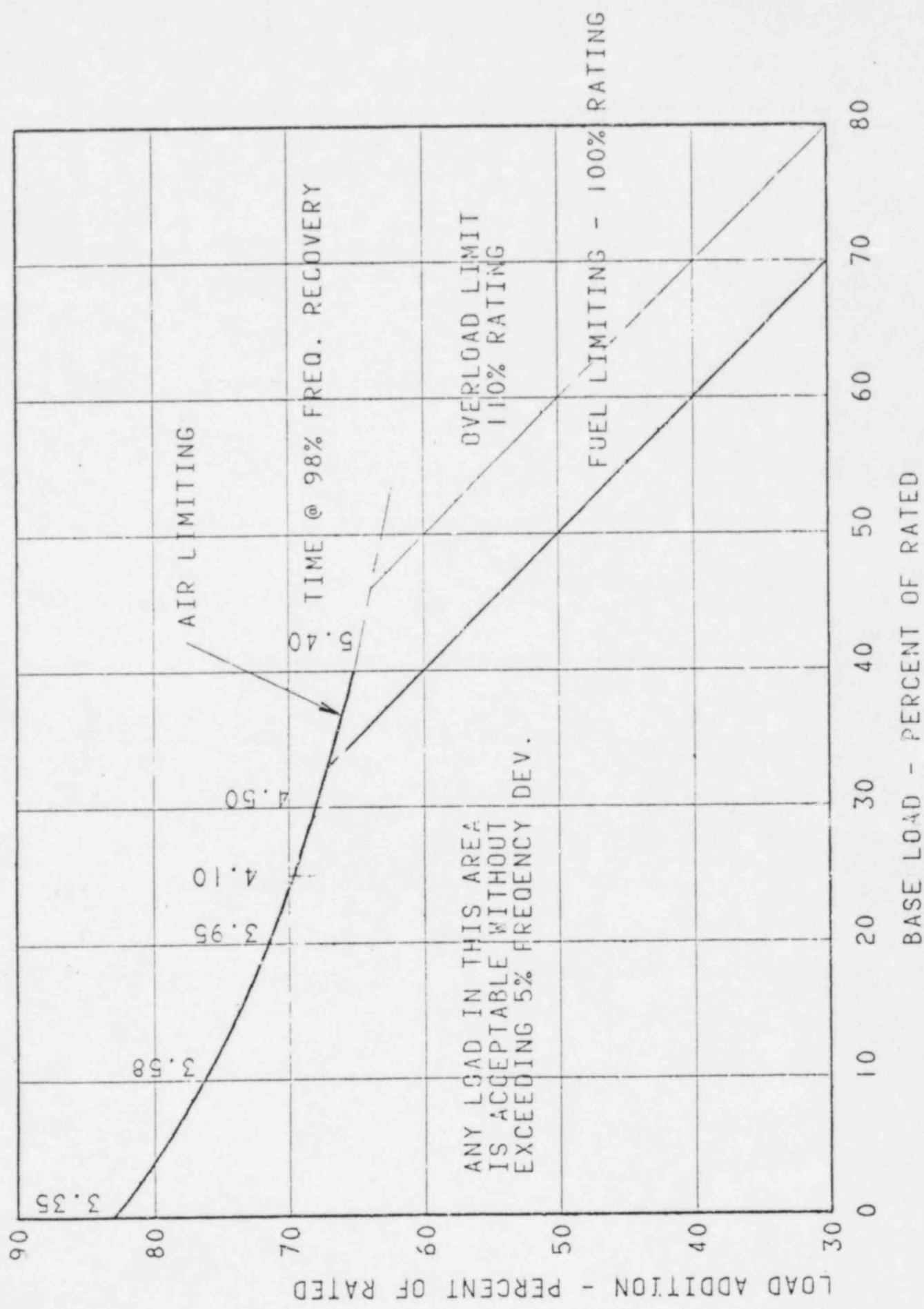


FIGURE 3. OP ENGINE CAPABILITY. 2850 KW @ 900 RPM, 34572 WR2.

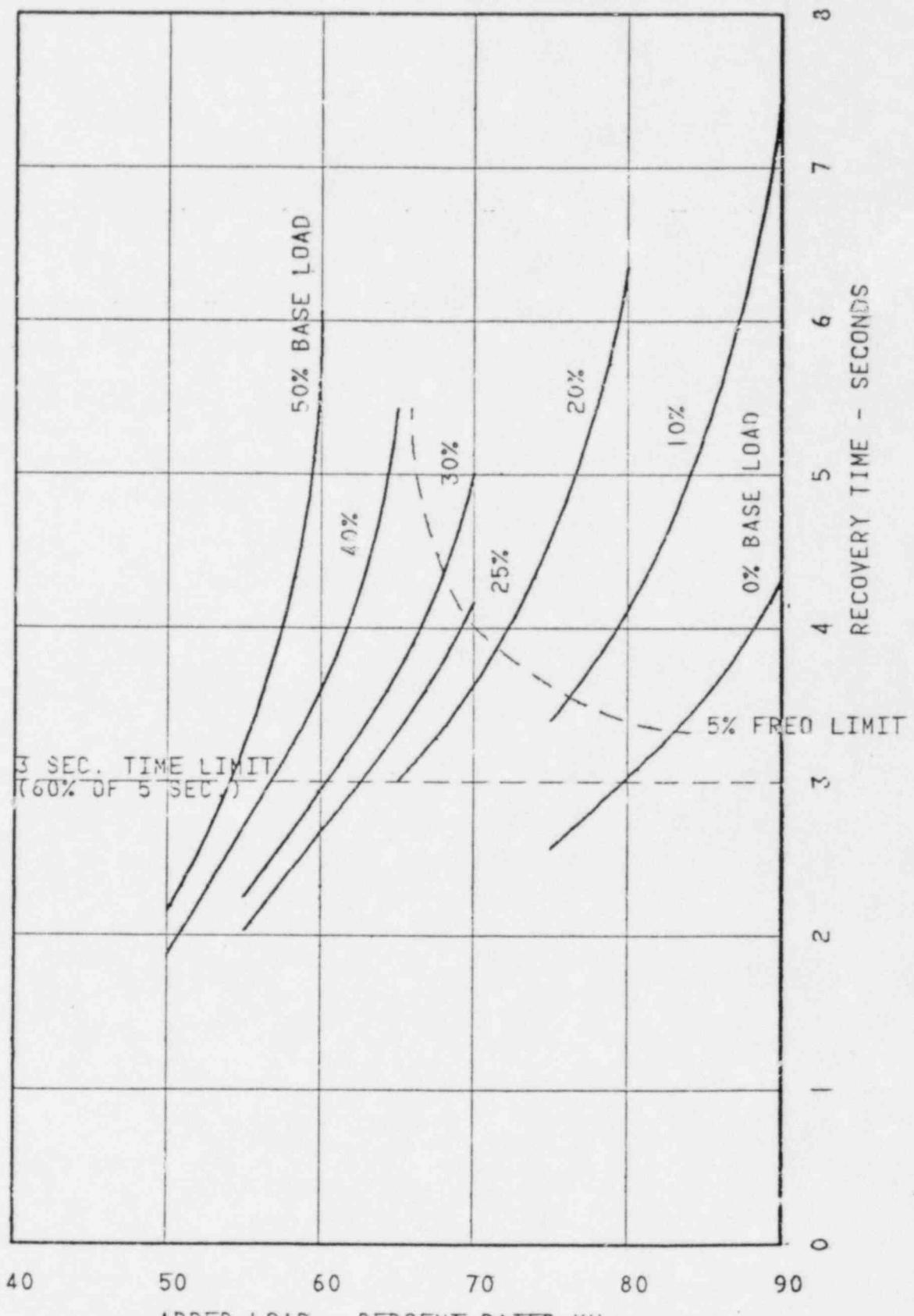


FIGURE 4. OP ENGINE LOAD CAPABILITY AND LIMITS
2850 KW AT 900 RPM, 34572 WRSQ

FREQUENCY AND VOLTAGE EXCURSION
PREDICTION PROGRAM - AN320010

APPENDIX A
ARKANSAS P&L 205925
UNITS 1 & 2, LOCA & MSLR
(This sh. also on LOP.)

Input data coding sheets:

Sheet 1.

Input data - Format 8F10.0 (Enter a Decimal Point in All Numbers)

(Read 1)	Symbol	Columns	Value
Transient Reactance	X'du	01-10	26.2-----
Sub-Transient Reactance	X"du	11-20	13.4-----
Generator Time Constant	T'do	21-30	5.68-----
Percent Recovery Voltage	RXV	31-40	90-----
Full Load Field Volts	FLFV	41-50	72-----
No Load Field Volts	NLFV	51-60	52-----
Maximum Field Volts-Forcing	MXFV	61-70	455-----
Generator Rated KVA	GRKVA	71-80	4063-----
 (Read 2)			
Engine Rated Load - KW	ERKW	01-10	2820-----
Engine Rated Speed - RPM	ERPM	11-20	1000-----
Number of Cylinders	CYL	21-30	12-----
Percent Overload Capability	POL	31-40	120-----
Strokes per Cycle	SPC (2 or 4)	41-50	2-----
Engine-Generator Inertia Lb-Ft-Sq	EWR2	51-60	34572.5-----
Percent Recovery Frequency	RXF	61-70	98-----
Rack Dead Time Constant	RDTC (.015)	71-80	.015-----
 (Read 3)			
Exciter Recovery Constant	ERC (5 to 10)	01-10	5-----
Generator Dip Constant	GDC (1667)	11-20	1667-----
System Dip Constant	SCN (575)	21-30	920-----
Percent Base Load Constant	XML (.45) Dec	31-40	.45-----
Load Recovery Constant	LRR (.125) "	41-50	.125-----
Time Increment - Seconds	TINC (.1)	51-60	.1-----
Voltage Overshoot Constant	VOSC (.6) Dec	61-70	.6-----
Friction Horsepower Ratio	FHPR (.15) "	71-80	.15-----
 (Read 4)			
Governor Dead Band	GDB (.1 - .25)	01-10	.1-----
Flag 20 - See Note 4, Sht 2	FLG20	11-20	.2-----
Exponent of Existing Load**	EXLF (1.- 2.)	21-30	1.5-----
Turbocharger Constant**	TURBO	31-40	1-----
Turbo-Charger Rate Factor**	TCRF	41-50	.95-----
Gov. Proportionality Rate Factor	GPRF (1.-1.5)	51-60	1.35-----
		61-70	-----
		71-80	-----

** See Note 5, Sheet 2.

LOAD DATA FOR STEP No. 1.

Sheet 2

Step Data - Any Number. Terminal Run with a /* card after the last step.

	Symbol	Columns	LocA	MSLR
(Read 5)				
Existing Load - KW	EKW	01-10	0	
Added Load - KW See Note 1	AKW	11-20	246	
In Rush Load - Motor Starting	SKVA	21-30	902	
Motor Horse Power-See Note 2 & 3	MHP1	31-40	140	
New Time, Start of Step - Sec	NTM	41-50	0	

CASE I II

NOTES: 1. For a load rejection (Off-Load) situation, the value should include a minus (-) sign; ie. -3000. Off loads may be used at any step in the program. If the last step, follow by /* card.

2. Input motor data using either Sheet 3 or 4. Sheet 3 is for cases where the motor torque vs speed (and load torque vs speed) data is known. Sheet 4 is used when the motor/load KW is in the form of KW vs TIME.
3. MHP1 should equal the total of the individual motor horsepowers (MHP2's from sheets 3 and/or 4) for each step.
4. Use FLG20 = 0 for the case of no accumulated resistive loading or when no effect is desired.
 If FLG20 = 1, program will use "existing load" plus "added KW Loading" in correcting for effect of voltage dip and overshoot.
 If FLG20 = 2, program will use "accumulated KW Loads" in correcting for the effect of voltage dip and overshoot.
5. For Turbocharged engines, for TURBO, input 1.
 For blower scavenged or naturally aspirated engines, input 0.
 For OP Turbo, input EXLF = 1. (Linear) or fit to suit curve.
 For PC Turbo, input EXLF = 2. (Exponential) or fit to suit.
 (For N/A or Blower Scavenged, EXLF is not used)
 For TCRF, input .7 for a decay rate of 50% in 2 seconds,
 or calculate factor as follows: (percent decay as a decimal)
 raised to the reciprocal of the time (in seconds) for that decay
 will give factor to put in as TCRF.

Use the following only if this is the last step of the program run:

End of Data - enter a /* as the last physical
 input card in the input stream - Cols 01-02 - - - - - / *.

NOTE: If input is by punch card, the last two data cards for any run, prior to the /* card (provided as part of the "Execute Job Control") should consist ~~of~~ at least one /* card.

Composite

Sheet 4

MOTOR DATA FOR STEP No. 1, MOTOR No. 1.

If this sheet is used, do not use a Sheet 3 for the same step.

MOTOR DATA - Alternate Method - KW vs Time Data. See Sht 3 for Primary Method.

	Symbol	Columns	Loca	MSCR
(Read 6)			Value.	
Motor Speed - RPM	MRPM	01-10	18ΦΦ.	
Motor Inertia - Lb-Ft-Sqd	MWR2	11-20	15Φ	
Motor Horsepower	MHP2	21-30	14Φ	13Σ
Motor Load in KW-Running Load	MLKW	31-40	116	112
Motor Slip/Load Constant-Percent	XMRG (75%)	41-50	75	

CASE I II

(Read 7)

Unloaded Motor Flag	FLG01	01-10		0.
Cube Curve Motor Load Calculation	FLG03	11-20		0.
Motor Load in KW vs TIME	FLG02 (Note 8)	21-30		25± STD.

NOTES: 8. Use a "2" for defining a "Standard Motor". Data is not required.

Omit Time and KW data below. If Motor Definition data is put in
(above), it will not be used in any of the calculations.

NOTE: Punch (key in) ALL Motor Torque Data before any Load Torque Data.

	Column	TIME	Column	LOAD - KW
	(Read 8b1)		(Read 9b1)	
1	01-10	-----	01-10	-----
2	11-20	-----	11-20	-----
3	21-30	-----	21-30	-----
4	31-40	-----	31-40	-----
5	41-50	-----	41-50	-----
6	51-60	-----	51-60	-----
7	61-70	-----	61-70	-----
8	71-80	-----	71-80	-----
	(Read 8b2)		(Read 9b2)	
9	01-10	-----	01-10	-----
10	11-20	-----	11-20	-----
11	21-30	-----	21-30	-----
12	31-40	-----	31-40	-----
13	41-50	-----	41-50	-----
14	51-60	-----	51-60	-----
15	61-70	-----	61-70	-----
16	71-80	-----	71-80	-----
	(Read 8b3)		(Read 9b3)	
17	01-10	-----	01-10	-----
18	11-20	-----	11-20	-----
19	21-30	-----	21-30	-----
20	31-40	-----	31-40	-----
21	41-50	-----	41-50	-----

End of data for 1 step - enter a /* following the last percent load torque curve card for the last motor for each step. If this is the last step in the Program run, this data should be followed by two (2) cards, /*, /* (then /&). See sheet 2.

Cols 01-02 - - /*.

LOAD DATA FOR STEP No. 2.

Sheet 2

Step Data - Any Number. Terminal Run with a /* card after the last step.

		Symbol	Columns	Value	Loca	MSLR
(Read 5)						
Existing Load - KW		EKW	01-10	362.1	358.	
Added Load - KW See Note 1		AKW	11-20	0.		
In Rush Load - Motor Starting		SKVA	21-30	4921.		
Motor Horse Power-See Note 2 & 3		MHP1	31-40	800.		
New Time, Start of Step - Sec		NTM	41-50	4.5 (5.5)		

CASE I II

NOTES: 1. For a load rejection (Off-Load) situation, the value should include a minus (-) sign; ie. -3000. Off loads may be used at any step in the program. If the last step, follow by /* card.

2. Input motor data using either Sheet 3 or 4. Sheet 3 is for cases where the motor torque vs speed (and load torque vs speed) data is known. Sheet 4 is used when the motor/load KW is in the form of KW vs TIME.
3. MHP1 should equal the total of the individual motor horsepowers (MHP2's from sheets 3 and/or 4) for each step.
4. Use FLG20 = 0 for the case of no accumulated resistive loading or when no effect is desired.
If FLG20 = 1, program will use "existing load" plus "added KW Loading" in correcting for effect of voltage dip and overshoot.
If FLG20 = 2, program will use "accumulated KW Loads" in correcting for the effect of voltage dip and overshoot.
5. For Turbocharged engines, for TURBO, input 1.
For blower scavenged or naturally aspirated engines, input 0.
For OP Turbo, input EXLF = 1. (Linear) or fit to suit curve.
For PC Turbo, input EXLF = 2. (Exponential) or fit to suit.
(For N/A or Blower Scavenged, EXLF is not used)
For TCRF, input .7 for a decay rate of 50% in 2 seconds,
or calculate factor as follows: (percent decay as a decimal)
raised to the reciprocal of the time (in seconds) for that decay
will give factor to put in as TCRF.

Use the following only if this is the last step of the program run:

End of Data - enter a /* as the last physical
input card in the input stream - Cols 01-02 - - - - - /*.

NOTE: If input is by punch card, the last two data cards for any run, prior to the /* card (provided as part of the "Execute Job Control") should consist of at least one /* card.

SERVICE WATER Pump

MOTOR DATA FOR STEP No. 2, MOTOR No. 1.

If this sheet is used, do not use a Sheet 4 for the same step.

Sheet 3

MOTOR DATA - 21 sets maximum per motor. Terminate last motor of a step with /*.

(Read 6)	Symbol	Columns	Value.
Motor Speed - RPM	MRPM	01-10	<u>885</u> .
Motor Inertia - Lb-Ft-Sqd	MWR2	11-20	<u>55143000</u> --
Motor Horsepower	MHP2	21-30	<u>800</u> .
Motor Load in KW-Running Load	MLKW	31-40	<u>622</u> --
Motor Slip/Load Constant-Percent	XMRC (75%)	41-50	<u>75</u> --

(Read 7)

Unloaded Motor Flag (Note 6)	FLG01	01-10	<u>0</u> .
Cube Curve Motor Load Calculation	FLG03 (Note 6)	11-20	<u>0</u> .
Motor Load in KW vs TIME (Sheet 4)	FLG02 (Note 7)	21-30	<u>0</u> .

NOTES: 6. If Load-Torque data is to be inputted, Cols 01-10 & 11-20, must be 0.

Otherwise, put a 1 in Cols 01-10, or 11-20, but NOT both.

7. Use Sheet 4 for data in the form of KW (or KVA) versus TIME.

NOTE: Punch (key in) ALL Motor Torque Data before any Load Torque Data.

Percent Speed	Column (Read 8a1)	Percent Motor Torque from Curve	Column (Read 9a1)	Percent Load Torque from Curve
1 0	01-10	<u>100</u> .	01-10	<u>15</u> .
2 5	11-20	<u>100</u> .	11-20	<u>2</u> .
3 10	21-30	<u>100</u> .	21-30	<u>4</u> .
4 15	31-40	<u>100</u> .	31-40	<u>3</u> .
5 20	41-50	<u>100</u> .	41-50	<u>4</u> .
6 25	51-60	<u>100</u> .	51-60	<u>6</u> .
7 30	61-70	<u>100</u> .	61-70	<u>9</u> .
8 35	71-80	<u>100</u> .	71-80	<u>13</u> .
	(Read 8a2)		(Read 9a2)	
9 40	01-10	<u>100</u> .	01-10	<u>17</u> .
10 45	11-20	<u>100</u> .	11-20	<u>20</u> .
11 50	21-30	<u>100</u> .	21-30	<u>26</u> .
12 55	31-40	<u>100</u> .	31-40	<u>31</u> .
13 60	41-50	<u>100</u> .	41-50	<u>32</u> .
14 65	51-60	<u>100</u> .	51-60	<u>40</u> .
15 70	61-70	<u>100</u> .	61-70	<u>48</u> .
16 75	71-80	<u>107</u> .	71-80	<u>56</u> .
	(Read 8a3)		(Read 9a3)	
17 80	01-10	<u>135</u> .	01-10	<u>62</u> .
18 85	11-20	<u>169</u> .	11-20	<u>72</u> .
19 90	21-30	<u>195</u> .	21-30	<u>80</u> .
20 95	31-40	<u>189</u> .	31-40	<u>90</u> .
21 100	41-50	<u>100</u> .	41-50	<u>98</u> .

End of data for 1 step - enter a /* following the last percent load torque curve card for the last motor for each step. If this is the last step in the Program run, this data should be followed by two (2) cards, /*, /* (then /&). See sheet 2.

Cols 01-02 - /*.

LOAD DATA FOR STEP No. 3.

Sheet 2

Step Data - Any Number. Terminal Run with a /* card after the last step.

		Symbol	Columns	Value	Loc A	MSLR
(Read 5)						
Existing Load - KW		EKW	01-10	984		980
Added Load - KW See Note 1		AKW	11-20	0		- - - -
In Rush Load - Motor Starting		SKVA	21-30	3531		- - - -
Motor Horse Power-See Note 2 & 3		MHP1	31-40	600		- - - -
New Time, Start of Step - Sec		NTM	41-50	10		- - - -
					CASE I	II

NOTES: 1. For a load rejection (Off-Load) situation, the value should include a minus (-) sign; ie. -3000. Off loads may be used at any step in the program. If the last step, follow by /* card.

2. Input motor data using either Sheet 3 or 4. Sheet 3 is for cases where the motor torque vs speed (and load torque vs speed) data is known. Sheet 4 is used when the motor/load KW is in the form of KW vs TIME.
3. MHP1 should equal the total of the individual motor horsepowers (MHP2's from sheets 3 and/or 4) for each step.
4. Use FLG20 = 0 for the case of no accumulated resistive loading or when no effect is desired.
If FLG20 = 1, program will use "existing load" plus "added KW Loading" in correcting for effect of voltage dip and overshoot.
If FLG20 = 2, program will use "accumulated KW Loads" in correcting for the effect of voltage dip and overshoot.
5. For Turbocharged engines, for TURBO, input 1.
For blower scavenged or naturally aspirated engines, input 0.
For OP Turbo, input EXLF = 1. (Linear) or fit to suit curve.
For PC Turbo, input EXLF = 2. (Exponential) or fit to suit.
(For N/A or Blower Scavenged, EXLF is not used)
For TCRF, input .7 for a decay rate of 50% in 2 seconds,
or calculate factor as follows: (percent decay as a decimal)
raised to the reciprocal of the time (in seconds) for that decay
will give factor to put in as TCRF.

Use the following only if this is the last step of the program run:

End of Data - enter a /* as the last physical
input card in the input stream - Cols 01-02 - - - - - / *.

NOTE: If input is by punch card, the last two data cards for any run, prior to the /* card (provided as part of the "Execute Job Control") should consist of at least one /* card.

MOTOR DATA FOR STEP No. 3, MOTOR No. 1.

If this sheet is used, do not use a Sheet 4 for the same step.

Sheet 3

MOTOR DATA - 21 sets maximum per motor. Terminate last motor of a step with /*.

Loca MSLR (same).

(Read 6)	Symbol	Columns	Value.
Motor Speed - RPM	MRPM	01-10	<u>3522</u> -----
Motor Inertia - Lb-Ft-Sqd	MWR2	11-20	<u>124</u> -----
Motor Horsepower	MHP2	21-30	<u>600</u> -----
Motor Load in KW-Running Load	MLKW	31-40	<u>390</u> -----
Motor Slip/Load Constant-Percent	XMRG (75%)	41-50	<u>22</u> -----

(Read 7)

Unloaded Motor Flag (Note 6)	FLG01	01-10	----- <u>0</u> -----
Cube Curve Motor Load Calculation	FLG03 (Note 6)	11-20	----- <u>0</u> -----
Motor Load in KW vs TIME (Sheet 4)	FLG02 (Note 7)	21-30	----- <u>0</u> -----

NOTES: 6. If Load-Torque data is to be inputted, Cols 01-10 & 11-20, must be 0. Otherwise, put a 1 in Cols 01-10, or 11-20, but NOT both.

7. Use Sheet 4 for data in the form of Kw (or KVA) versus TIME.

NOTE: Punch (key in) ALL Motor Torque Data before any Load Torque Data.

Percent Speed	Column (Read 8a1)	Percent Motor Torque from Curve	Column (Read 9a1)	Percent Load Torque from Curve
1 0	01-10	<u>70</u> -----	01-10	<u>15</u> -----
2 5	11-20	<u>71</u> -----	11-20	<u>9</u> -----
3 10	21-30	<u>73</u> -----	21-30	<u>5</u> -----
4 15	31-40	<u>74</u> -----	31-40	<u>4</u> -----
5 20	41-50	<u>76</u> -----	41-50	<u>4</u> -----
6 25	51-60	<u>78</u> -----	51-60	<u>6</u> -----
7 30	61-70	<u>81</u> -----	61-70	<u>8</u> -----
8 35	71-80	<u>84</u> -----	71-80	<u>10</u> -----
	(Read 8a2)		(Read 9a2)	
9 40	01-10	<u>88</u> -----	01-10	<u>14</u> -----
10 45	11-20	<u>93</u> -----	11-20	<u>17</u> -----
11 50	21-30	<u>106</u> -----	21-30	<u>22</u> -----
12 55	31-40	<u>123</u> -----	31-40	<u>26</u> -----
13 60	41-50	<u>141</u> -----	41-50	<u>31</u> -----
14 65	51-60	<u>156</u> -----	51-60	<u>37</u> -----
15 70	61-70	<u>166</u> -----	61-70	<u>43</u> -----
16 75	71-80	<u>172</u> -----	71-80	<u>50</u> -----
	(Read 8a3)		(Read 9a3)	
17 80	01-10	<u>175</u> -----	01-10	<u>57</u> -----
18 85	11-20	<u>173</u> -----	11-20	<u>64</u> -----
19 90	21-30	<u>168</u> -----	21-30	<u>72</u> -----
20 95	31-40	<u>157</u> -----	31-40	<u>80</u> -----
21 100	41-50	<u>100</u> -----	41-50	<u>88</u> -----

End of data for 1 step - enter a /* following the last percent load torque curve card for the last motor for each step. If this is the last step in the Program run, this data should be followed by two (2) cards, /*, /* (then /&). See sheet 2.

Cols 01-02 - /*

LOAD DATA FOR STEP No. 4.

Sheet 2

Step Data - Any Number. Terminal Run with a /* card after the last step.

	Symbol	Columns	Loca	MSLR
(Read 5)				
Existing Load - KW	EKW	01-10	1292	1287
Added Load - KW See Note 1	AKW	11-20	0	
In Rush Load - Motor Starting	SKVA	21-30	2954	2623 UNIT 1
Motor Horse Power-See Note 2 & 3	MHP1	31-40	500	450 UNIT 1
New Time, Start of Step - Sec	NTM	41-50	15	

CASE I II

500 e
~~2954~~ used
 in all
 cases

- NOTES:
1. For a load rejection (Off-Load) situation, the value should include a minus (-) sign; ie. -3000. Off loads may be used at any step in the program. If the last step, follow by /* card.
 2. Input motor data using either Sheet 3 or 4. Sheet 3 is for cases where the motor torque vs speed (and load torque vs speed) data is known. Sheet 4 is used when the motor/load KW is in the form of KW vs TIME.
 3. MHP1 should equal the total of the individual motor horsepowers (MHP2's from sheets 3 and/or 4) for each step.
 4. Use FLG20 = 0 for the case of no accumulated resistive loading or when no effect is desired.
 If FLG20 = 1, program will use "existing load" plus "added KW Loading" in correcting for effect of voltage dip and overshoot.
 If FLG20 = 2, program will use "accumulated KW Loads" in correcting for the effect of voltage dip and overshoot.
 5. For Turbocharged engines, for TURBO, input 1.
 For blower scavenged or naturally aspirated engines, input 0.
 For OP Turbo, input EXLF = 1. (Linear) or fit to suit curve.
 For PC Turbo, input EXLF = 2. (Exponential) or fit to suit.
 (For N/A or Blower Scavenged, EXLF is not used)
 For TCRF, input .7 for a decay rate of 50% in 2 seconds,
 or calculate factor as follows: (percent decay as a decimal)
 raised to the reciprocal of the time (in seconds) for that decay
 will give factor to put in as TCRF.

Use the following only if this is the last step of the program run:

End of Data - enter a /* as the last physical
 input card in the input stream - Cols 01-02 - - - - - /*.

NOTE: If input is by punch card, the last two data cards for any run, prior to the /* card (provided as part of the "Execute Job Control") should consist of at least one /* card.

MOTOR DATA FOR STEP No. 4, MOTOR No.
If this sheet is used, do not use a Sheet 4 for the

Sheet 3

MOTOR DATA - 21 sets maximum per motor. Terminate last motor of a step with /*.

(Read 6)	Symbol	Columns	Value.
Motor Speed - RPM	MRPM	01-10	178Φ-
Motor Inertia - Lb-Ft-Sqd	MWR2	11-20	309---(311.6)
Motor Horsepower	MHP2	21-30	500---(450.1)
Motor Load in KW-Running Load	MLKW	31-40	352---166.-
Motor Slip/Load Constant-Percent	XMRC (75%)	41-50	75-----

(Read 7)

Unloaded Motor Flag (Note 6) FLGØ1 01-10
 Cube Curve Motor Load Calculation FLGØ3 (Note 6) 11-20
 Motor Load in KW vs TIME (Sheet 4)FLGØ2 (Note 7) 21-30

NOTES: 6. If Load-Torque data is to be inputted, Cols 01-10 & 11-20, must be @. Otherwise, put a 1 in Cols 01-10, or 11-20, but NOT both.

7. Use Sheet 4 for data in the form of KW (or KVA) versus TIME.

USE SOOH.

DATA FOR

ALL STEPS

NOTE: Punch (key in) All Motor Torque Data before any Load Torque Data.

Percent Speed	Column (Read 8a1)	Percent Motor Torque from Curve 500 HP	Column (Read 9a1)	Percent Load Torque from Curve 500 HP
1 0	01-10	1 4 6	1 0 6	1 5 - 1 3
2 5	11-20	1 0 2	1 0 L	9 - 8
3 10	21-30	1 0 3	1 0 2	6 - 5
4 15	31-40	1 0 4	1 0 3	4 - 4
5 20	41-50	1 0 7	1 0 5	4 - 4
6 25	51-60	1 1 0	1 0 7	5 - 5
7 30	61-70	1 1 3	1 0 9	8 - 7
8 35	71-80	1 1 7	1 1 2	1 0 - 9
	(Read 8a2)		(Read 9a2)	
9 40	01-10	1 2 1	1 1 6	1 3 - 1 2
10 45	11-20	1 2 5	1 2 1	1 2 - 1 5
11 50	21-30	1 3 2	1 2 2	2 2 - 1 9
12 55	31-40	1 4 2	1 3 8	2 6 - 2 4
13 60	41-50	1 4 4	1 5 8	3 1 - 2 8
14 65	51-60	1 8 2	1 7 5	3 7 - 3 3
15 70	61-70	1 9 3	1 8 6	4 2 - 3 8
16 75	71-80	1 9 8	1 9 5	4 9 - 4 4
	(Read 8a3)		(Read 9a3)	
17 80	01-10	2 0 0	2 0 0	5 6 - 5 0
18 85	11-20	1 9 6	1 9 9	6 3 - 5 7
19 90	21-30	1 8 5	1 9 1	7 1 - 6 5
20 95	31-40	1 6 2	1 6 6	7 9 - 2 2
21 100	41-50	1 6 0	1 0 0	8 7 - 2 8

End of data for 1 step - enter a /* following the last percent load torque curve card for the last motor for each step. If this is the last step in the Program run, this data should be followed by two (2) cards, /*, /* (then /&). See sheet 2.

cols 01-02 - 1*

LOAD DATA FOR STEP No. 5.

Sheet 2

Step Data - Any Number. Terminal Run with a /* card after the last step.

			LocA	MSLR
		Symbol	Columns	Value
(Read 5)				
Existing Load - KW		EKW	01-10	1644.1453.
Added Load - KW See Note 1		AKW	11-20	0.1044-----
In Rush Load - Motor Starting		SKVA	21-30	1044-----
Motor Horse Power-See Note 2 & 3		MHP1	31-40	150-----
New Time, Start of Step - Sec		NTM	41-50	20-----
				CASE I II

NOTES: 1. For a load rejection (Off-Load) situation, the value should include a minus (-) sign; ie. -3000. Off loads may be used at any step in the program. If the last step, follow by /* card.

2. Input motor data using either Sheet 3 or 4. Sheet 3 is for cases where the motor torque vs speed (and load torque vs speed) data is known. Sheet 4 is used when the motor/load KW is in the form of KW vs TIME.
3. MHP1 should equal the total of the individual motor horsepowers (MHP2's from sheets 3 and/or 4) for each step.
4. Use FLG2Ø = Ø for the case of no accumulated resistive loading or when no effect is desired.
If FLG2Ø = 1, program will use "existing load" plus "added KW Loading" in correcting for effect of voltage dip and overshoot.
If FLG2Ø = 2, program will use "accumulated KW Loads" in correcting for the effect of voltage dip and overshoot.
5. For Turbocharged engines, for TURBO, input 1.
For blower scavenged or naturally aspirated engines, input Ø.
For OP Turbo, input EXLF = 1. (Linear) or fit to suit curve.
For PC Turbo, input EXLF = 2. (Exponential) or fit to suit.
(For N/A or Blower Scavenged, EXLF is not used)
For TCRF, input .7 for a decay rate of 50% in 2 seconds,
or calculate factor as follows: (present decay as a decimal)
raised to the reciprocal of the time (in seconds) for that decay
will give factor to put in as TCRF.

Use the following only if this is the last step of the program run:

End of Data - enter a /* as the last physical input card in the input stream - Cols 01-02 ----- /*.

NOTE: If input is by punch card, the last two data cards for any run, prior to the /* card (provided as part of the "Execute Job Control") should consist of at least one /* card.

2*75 = 150 HP

CONTAINMENT CLR FANS.

Sheet 3

MOTOR DATA FOR STEP No. 5, MOTOR No. 1.
 If this sheet is used, do not use a Sheet 4 for the same step.

MOTOR DATA - 21 sets maximum per motor. Terminate last motor of a step with /*.

(Read 6)	Symbol	Columns	Value.
Motor Speed - RPM	MRPM	01-10	<u>1190</u> .
Motor Inertia - Lb-Ft-Sqd	MWR2	11-20	<u>340</u> .
Motor Horsepower	MHP2	21-30	<u>150</u> .
Motor Load in KW-Running Load	MLKW	31-40	<u>124</u> .
Motor Slip/Load Constant-Percent	XMRG (75%)	41-50	<u>75</u> .

(Read 7)

Unloaded Motor Flag (Note 6)	FLG01	01-10	<u>0</u> .
Cube Curve Motor Load Calculation	FLG03 (Note 6)	11-20	<u>1</u> .
Motor Load in KW vs TIME (Sheet 4)	FLG02 (Note 7)	21-30	<u>0</u> .

NOTES: 6. If Load-Torque data is to be inputted, Cols 01-10 & 11-20, must be 0.
 Otherwise, put a 1 in Cols 01-10, or 11-20, but NOT both.
 7. Use Sheet 4 for data in the form of KW (or KVA) versus TIME.

NOTE: Punch (key in) ALL Motor Torque Data before any Load Torque Data.

Percent Speed	Column (Read 8a1)	Percent Motor Torque from Curve	Column (Read 9a1)	Percent Load Torque from Curve
1 0	01-10	<u>187</u> .	01-10	
2 5	11-20	<u>218</u> .	11-20	
3 10	21-30	<u>231</u> .	21-30	
4 15	31-40	<u>230</u> .	31-40	
5 20	41-50	<u>222</u> .	41-50	
6 25	51-60	<u>219</u> .	51-60	
7 30	61-70	<u>218</u> .	61-70	
8 35	71-80	<u>215</u> .	71-80	
	(Read 8a2)		(Read 9a2)	
9 40	01-10	<u>212</u> .	01-10	
10 45	11-20	<u>209</u> .	11-20	
11 50	21-30	<u>204</u> .	21-30	
12 55	31-40	<u>201</u> .	31-40	
13 60	41-50	<u>197</u> .	41-50	
14 65	51-60	<u>194</u> .	51-60	
15 70	61-70	<u>189</u> .	61-70	
16 75	71-80	<u>189</u> .	71-80	
	(Read 8a3)		(Read 9a3)	
17 80	01-10	<u>188</u> .	01-10	
18 85	11-20	<u>201</u> .	11-20	
19 90	21-30	<u>231</u> .	21-30	
20 95	31-40	<u>260</u> .	31-40	
21 100	41-50	<u>190</u> .	41-50	

End of data for 1 step - enter a /* following the last percent load torque curve card for the last motor for each step. If this is the last step in the Program run, this data should be followed by two (2) cards, /*, /* (then /&). See sheet 2.

Cols 01-02 - -T*.

LOAD DATA FOR STEP No. 6.

Sheet 2

Step Data - Any Number. Terminal Run with a /* card after the last step.

	Symbol	Columns	LocA	MSLA
(Read 5)			Value	
Existing Load - KW	EKW	01-10	<u>1768</u>	<u>1577</u>
Added Load - KW See Note 1	AKW	11-20	<u>0</u>	
In Rush Load - Motor Starting	SKVA	21-30	2730	
Motor Horse Power-See Note 2 & 3	MHP1	31-40	<u>452</u>	
New Time, Start of Step - Sec	NTM	41-50	<u>25</u>	

CASE I II

NOTES: 1. For a load rejection (Off-Load) situation, the value should include a minus (-) sign; ie. -3000. Off loads may be used at any step in the program. If the last step, follow by /* card.

2. Input motor data using either Sheet 3 or 4. Sheet 3 is for cases where the motor torque vs speed (and load torque vs speed) data is known. Sheet 4 is used when the motor/load KW is in the form of KW vs TIME.
3. MHP1 should equal the total of the individual motor horsepowers (MHP2's from sheets 3 and/or 4) for each step.
4. Use FLG2Ø = Ø for the case of no accumulated resistive loading or when no effect is desired.
If FLG2Ø = 1, program will use "existing load" plus "added KW Loading" in correcting for effect of voltage dip and overshoot.
If FLG2Ø = 2, program will use "accumulated KW Loads" in correcting for the effect of voltage dip and overshoot.
5. For Turbocharged engines, for TURBO, input 1.
For blower scavenged or naturally aspirated engines, input Ø.
For OP Turbo, input EXLF = 1. (Linear) or fit to suit curve.
For PC Turbo, input EXLF = 2. (Exponential) or fit to suit.
(For N/A or Blower Scavenged, EXLF is not used)
For TCRF, input .7 for a decay rate of 50% in 2 seconds,
or calculate factor as follows: (percent decay as a decimal)
raised to the reciprocal of the time (in seconds) for that decay
will give factor to put in as TCRF.

Use the following only if this is the last step of the program run:

End of Data - enter a /* as the last physical
input card in the input stream - Cols 01-02 - - - - - / *.

NOTE: If input is by punch card, the last two data cards for any run, prior to the /* card (provided as part of the "Execute Job Control") should consist fo at leat one /* card.

MOTOR DATA FOR STEP No. 6, MOTOR No. 1.

Sheet 3

If this sheet is used, do not use a Sheet 4 for the same step.

MOTOR DATA - 21 sets maximum per motor. Terminate last motor of a step with /*.

(Read 6)	Symbol	Columns	Value.
Motor Speed - RPM	MRPM	01-10	<u>178</u> Φ-----
Motor Inertia - Lb-Ft-Sqd	MWR2	11-20	<u>335</u> -----
Motor Horsepower	MHP2	21-30	<u>455</u> -----
Motor Load in KW-Running Load	MLKW	31-40	<u>377</u> -----
Motor Slip/Load Constant-Percent	XMRG (75%)	41-50	<u>75</u> -----

(Read 7)

Unloaded Motor Flag (Note 6)	FLGØ1	01-10	-----Φ
Cube Curve Motor Load Calculation	FLGØ3 (Note 6)	11-20	-----Φ
Motor Load in KW vs TIME (Sheet 4)	FLGØ2 (Note 7)	21-30	-----Φ

NOTES: 6. If Load-Torque data is to be inputted, Cols 01-10 & 11-20, must be Ø.

Otherwise, put a 1 in Cols 01-10, or 11-20, but NOT both.

7. Use Sheet 4 for data in the form of KW (or KVA) versus TIME.

NOTE: Punch (key in) ALL Motor Torque Data before any Load Torque Data.

Percent Speed	Column (Read 8a1)	Percent Motor Torque from Curve	Column (Read 9a1)	Percent Load Torque from Curve
1 Ø	01-10	<u>100</u> -----	01-10	<u>12</u> -----
2 5	11-20	<u>101</u> -----	11-20	<u>11</u> -----
3 10	21-30	<u>104</u> -----	21-30	<u>7</u> -----
4 15	31-40	<u>106</u> -----	31-40	<u>5</u> -----
5 20	41-50	<u>109</u> -----	41-50	<u>5</u> -----
6 25	51-60	<u>112</u> -----	51-60	<u>6</u> -----
7 30	61-70	<u>115</u> -----	61-70	<u>9</u> -----
8 35	71-80	<u>119</u> -----	71-80	<u>12</u> -----
	(Read 8a2)		(Read 9a2)	
9 40	01-10	<u>125</u> -----	01-10	<u>17</u> -----
10 45	11-20	<u>130</u> -----	11-20	<u>21</u> -----
11 50	21-30	<u>132</u> -----	21-30	<u>26</u> -----
12 55	31-40	<u>132</u> -----	31-40	<u>32</u> -----
13 60	41-50	<u>172</u> -----	41-50	<u>37</u> -----
14 65	51-60	<u>184</u> -----	51-60	<u>44</u> -----
15 70	61-70	<u>194</u> -----	61-70	<u>51</u> -----
16 75	71-80	<u>198</u> -----	71-80	<u>58</u> -----
	(Read 8a3)		(Read 9a3)	
17 80	01-10	<u>198</u> -----	01-10	<u>66</u> -----
18 85	11-20	<u>192</u> -----	11-20	<u>75</u> -----
19 90	21-30	<u>192</u> -----	21-30	<u>82</u> -----
20 95	31-40	<u>180</u> -----	31-40	<u>93</u> -----
21 100	41-50	<u>100</u> -----	41-50	<u>98</u> -----

End of data for 1 step - enter a /* following the last percent load torque curve card for the last motor for each step. If this is the last step in the Program run, this data should be followed by two (2) cards, /*, /* (then /&). See sheet 2.

Cols 01-02 - - /*.

LOAD DATA FOR STEP No. 798.

Sheet 2

Step Data - Any Number. Terminal Run with a /* card after the last step.

(Read 5)	Symbol	Columns	7 LOCA	8 MSLA	7 LOCA	8 MSLR
Existing Load - KW	EKW	01-10	21 45	1954	2210	2019
Added Load - KW See Note 1	AKW	11-20	8			
In Rush Load - Motor Starting	SKVA	21-30	536	60		
Motor Horse Power-See Note 2 & 3	MHP1	31-40	105			
New Time, Start of Step - Sec	NTM	41-50	50		60	
					CASE I II I II	

NOTES: 1. For a load rejection (Off-Load) situation, the value should include a minus (-) sign; ie. -3000. Off loads may be used at any step in the program. If the last step, follow by /* card.

2. Input motor data using either Sheet 3 or 4. Sheet 3 is for cases where the motor torque vs speed (and load torque vs speed) data is known. Sheet 4 is used when the motor/load KW is in the form of KW vs TIME.
3. MHP1 should equal the total of the individual motor horsepowers (MHP2's from sheets 3 and/or 4) for each step.
4. Use FLG2Ø = Ø for the case of no accumulated resistive loading or when no effect is desired.
 If FLG2Ø = 1, program will use "existing load" plus "added KW Loading" in correcting for effect of voltage dip and overshoot.
 If FLG2Ø = 2, program will use "accumulated KW Loads" in correcting for the effect of voltage dip and overshoot.
5. For Turbocharged engines, for TURBO, input 1.
 For blower scavenged or naturally aspirated engines, input Ø.
 For OP Turbo, input EXLF = 1. (Linear) or fit to suit curve.
 For PC Turbo, input EXLF = 2. (Exponential) or fit to suit.
 (For N/A or Blower Scavenged, EXLF is not used)
 For TCRF, input .7 for a decay rate of 50% in 2 seconds,
 or calculate factor as follows: (percent decay as a decimal)
 raised to the reciprocal of the time (in seconds) for that decay
 will give factor to put in as TCRF.

Use the following only if this is the last step of the program run:

End of Data - enter a /* as the last physical
 input card in the input stream - Cols 01-02 - - - - - /*.

NOTE: If input is by punch card, the last two data cards for any run, prior to the /* card (provided as part of the "Execute Job Control") should consist of at least one /* card.

MOTOR DATA FOR STEP No. 7 & 8, MOTOR No. 1/1.

If this sheet is used, do not use a Sheet 4 for the same step.

Sheet 3

MOTOR DATA - 21 sets maximum per motor. Terminate last motor of a step with /*.

(Read 6)	Symbol	Columns	Value.
Motor Speed - RPM	MRPM	01-10	<u>1725</u> -----
Motor Inertia - Lb-Ft-Sqd	MWR2	11-20	<u>85</u> -----
Motor Horsepower	MHP2	21-30	<u>10.5</u> -----
Motor Load in KW-Running Load	MLKW	31-40	<u>65</u> -----
Motor Slip/Load Constant-Percent	XMRG (75%)	41-50	<u>75</u> -----

(Read 7)

Unloaded Motor Flag (Note 6)	FLG01	01-10	----- Φ -----
Cube Curve Motor Load Calculation	FLG03 (Note 6)	11-20	----- $\frac{1}{2}$ -----
Motor Load in KW vs TIME (Sheet 4)	FLG02 (Note 7)	21-30	----- \emptyset -----

NOTES: 6. If Load-Torque data is to be inputted, Cols 01-10 & 11-20, must be \emptyset . Otherwise, put a 1 in Cols 01-10, or 11-20, but NOT both.

7. Use Sheet 4 for data in the form of KW (or KVA) versus TIME.

NOTE: Punch (key in) ALL Motor Torque Data before any Load Torque Data.

Percent Speed	Column (Read 8a1)	Percent Motor Torque from Curve	Column (Read 9a1)	Percent Load Torque from Curve
1 \emptyset	01-10	<u>258</u> -----	01-10	-----
2 5	11-20	<u>242</u> -----	11-20	-----
3 10	21-30	<u>227</u> -----	21-30	-----
4 15	31-40	<u>216</u> -----	31-40	-----
5 20	41-50	<u>207</u> -----	41-50	-----
6 25	51-60	<u>197</u> -----	51-60	-----
7 30	61-70	<u>189</u> -----	61-70	-----
8 35	71-80	<u>183</u> -----	71-80	-----
	(Read 8a2)		(Read 9a2)	-----
9 40	01-10	<u>176</u> -----	01-10	-----
10 45	11-20	<u>171</u> -----	11-20	-----
11 50	21-30	<u>166</u> -----	21-30	-----
12 55	31-40	<u>162</u> -----	31-40	-----
13 60	41-50	<u>161</u> -----	41-50	-----
14 65	51-60	<u>161</u> -----	51-60	-----
15 70	61-70	<u>164</u> -----	61-70	-----
16 75	71-80	<u>168</u> -----	71-80	-----
	(Read 8a3)		(Read 9a3)	-----
17 80	01-10	<u>172</u> -----	01-10	-----
18 85	11-20	<u>193</u> -----	11-20	-----
19 90	21-30	<u>213</u> -----	21-30	-----
20 95	31-40	<u>193</u> -----	31-40	-----
21 100	41-50	<u>190</u> -----	41-50	-----

End of data for 1 step - enter a /* following the last percent load torque curve card for the last motor for each step. If this is the last step in the Program run, this data should be followed by two (2) cards, /*, /* (then /&). See sheet 2.

Cols 01-02 - /*.

LOAD DATA FOR STEP No. 9.

Sheet 2

Step Data - Any Number. Terminal Run with a /* card after the last step.

(Read 5)	Symbol	Columns	Loca	MSLR
Existing Load - KW	EKW	01-10	2275 -	2084.
Added Load - KW See Note 1	AKW	11-20	0 - #2	- - -
In Rush Load - Motor Starting	SKVA	21-30	#1 308. 592.	- - - .308.
Motor Horse Power-See Note 2 & 3	MHP1	31-40	#1 50 - 100	- - - 50.
New Time, Start of Step - Sec	NTM	41-50	70 -	- - -

CASE → I II

NOTES: 1. For a load rejection (Off-Load) situation, the value should include a minus (-) sign; ie. -3000. Off loads may be used at any step in the program. If the last step, follow by /* card.

2. Input motor data using either Sheet 3 or 4. Sheet 3 is for cases where the motor torque vs speed (and load torque vs speed) data is known. Sheet 4 is used when the motor/load KW is in the form of KW vs TIME.
3. MHP1 should equal the total of the individual motor horsepowers (MHP2's from sheets 3 and/or 4) for each step.
4. Use FLG20 = 0 for the case of no accumulated resistive loading or when no effect is desired.
If FLG20 = 1, program will use "existing load" plus "added KW Loading" in correcting for effect of voltage dip and overshoot.
If FLG20 = 2, program will use "accumulated KW Loads" in correcting for the effect of voltage dip and overshoot.
5. For Turbocharged engines, for TURBO, input 1.
For blower scavenged or naturally aspirated engines, input 0.
For OP Turbo, input EXLF = 1. (Linear) or fit to suit curve.
For PC Turbo, input EXLF = 2. (Exponential) or fit to suit.
(For N/A or Blower Scavenged, EXLF is not used)
For TCRF, input .7 for a decay rate of 50% in 2 seconds,
or calculate factor as follows: (present decay as a decimal)
raised to the reciprocal of the time (in seconds) for that decay
will give factor to put in as TCRF.

Use the following only if this is the last step of the program run:

End of Data - enter a /* as the last physical
input card in the input stream - Cols 01-02 - - - - - /*.

NOTE: If input is by punch card, the last two data cards for any run, prior to the /* card (provided as part of the "Execute Job Control") should consist of at least one /* card.

MOTOR DATA FOR STEP No. 9, MOTOR No. 1.

Sheet 4

If this sheet is used, do not use a Sheet 3 for the same step.

MOTOR DATA - Alternate Method - KW vs Time Data. See Sht 3 for Primary Method.

(Read 6)	Symbol	Columns	Value.
Motor Speed - RPM	MRPM	01-10	<u>1800</u> -----
Motor Inertia - Lb-Ft-Sqd	MWR2	11-20	<u>50</u> -----
Motor Horsepower	MHP2	21-30	<u>1/2</u> -----
Motor Load in KW-Running Load	MLKW	31-40	<u>141</u> -----
Motor Slip/Load Constant-Percent	XMRC (75%)	41-50	<u>75</u> -----

CASE II ST

(Read 7)

Unloaded Motor Flag	FLG01	01-10	----- <u>0</u> -----
Cube Curve Motor Load Calculation	FLG03	11-20	----- <u>0</u> -----
Motor Load in KW vs TIME	FLG02 (Note 8)	21-30	----- <u>2</u> . <u>1</u> <u>STD</u>

NOTES: 8. Use a "2" for defining a "Standard Motor". Data is not required.
 Omit Time and KW data below. If Motor Definition data is put in
 (above), it will not be used in any of the calculations.

NOTE: Punch (key in) ALL Motor Torque Data before any Load Torque Data.

	Column	TIME	Column	LOAD - KW
	(Read 8b1)		(Read 9b1)	
1	01-10	-----	01-10	-----
2	11-20	-----	11-20	-----
3	21-30	-----	21-30	-----
4	31-40	-----	31-40	-----
5	41-50	-----	41-50	-----
6	51-60	-----	51-60	-----
7	61-70	-----	61-70	-----
8	71-80	-----	71-80	-----
	(Read 8b2)	-----	(Read 9b2)	-----
9	01-10	-----	01-10	-----
10	11-20	-----	11-20	-----
11	21-30	-----	21-30	-----
12	31-40	-----	31-40	-----
13	41-50	-----	41-50	-----
14	51-60	-----	51-60	-----
15	61-70	-----	61-70	-----
16	71-80	-----	71-80	-----
	(Read 8b3)	-----	(Read 9b3)	-----
17	01-10	-----	01-10	-----
18	11-20	-----	11-20	-----
19	21-30	-----	21-30	-----
20	31-40	-----	31-40	-----
21	41-50	-----	41-50	-----

End of data for 1 step - enter a /* following the last percent load torque curve card for the last motor for each step. If this is the last step in the Program run, this data should be followed by two (2) cards, /*, /* (then /&). See sheet 2.

Cols 01-02 - -/*.

LOAD DATA FOR STEP No. 10.

Sheet 2

Step Data - Any Number. Terminal Run with a /* card after the last step.

	Symbol	Columns	Loca	Value	MSLR
(Read 5)			#1	#2	#1
Existing Load - KW	EKW	01-10	23 16	(2358)	2126 (2167)
Added Load - KW See Note 1	AKW	11-20	Ø		
In Rush Load - Motor Starting	SKVA	21-30	28 8	(252)	28 8 (252)
Motor Horse Power-See Note 2 & 3	MHP1	31-40	9 2	- (37)	42 (37)
New Time, Start of Step - Sec	NTM	41-50	8 Ø	- - - - -	- - - - -
			CASG	I	II

NOTES: 1. For a load rejection (Off-Load) situation, the value should include a minus (-) sign; ie. -3000. Off loads may be used at any step in the program. If the last step, follow by /* card.

2. Input motor data using either Sheet 3 or 4. Sheet 3 is for cases where the motor torque vs speed (and load torque vs speed) data is known. Sheet 4 is used when the motor/load KW is in the form of KW vs TIME.
3. MHP1 should equal the total of the individual motor horsepowers (MHP2's from sheets 3 and/or 4) for each step.
4. Use FLG2Ø = 0 for the case of no accumulated resistive loading or when no effect is desired.
If FLG2Ø = 1, program will use "existing load" plus "added KW Loading" in correcting for effect of voltage dip and overshoot.
If FLG2Ø = 2, program will use "accumulated KW Loads" in correcting for the effect of voltage dip and overshoot.
5. For Turbocharged engines, for TURBO, input 1.
For blower scavenged or naturally aspirated engines, input 0.
For OP Turbo, input EXLF = 1. (Linear) or fit to suit curve.
For PC Turbo, input EXLF = 2. (Exponential) or fit to suit.
(For N/A or Blower Scavenged, EXLF is not used)
For TCRF, input .7 for a decay rate of 50% in 2 seconds,
or calculate factor as follows: (present decay as a decimal)
raised to the reciprocal of the time (in seconds) for that decay
will give factor to put in as TCRF.

Use the following only if this is the last step of the program run:

End of Data - enter a /* as the last physical input card in the input stream - Cols 01-02 - - - - - /*.

NOTE: If input is by punch card, the last two data cards for any run, prior to the /* card (provided as part of the "Execute Job Control") should consist of at least one /* card.

MOTOR DATA FOR STEP No. 10, MOTOR No. 1/1.

Sheet 4

If this sheet is used, do not use a Sheet 3 for the same step.

MOTOR DATA - Alternate Method - KW vs Time Data. See Sht 3 for Primary Method.

		Symbol	Columns	Value.	#1	#2
(Read 6)						
Motor Speed - RPM		MRPM	01-10	1800		
Motor Inertia - Lb-Ft-Sqd		MWR2	11-20	56		
Motor Horsepower		MHP2	21-30	42 (37)		
Motor Load in KW-Running Load		MLKW	31-40	35 (31)		
Motor Slip/Load Constant-Percent		XMRG (75%)	41-50	75		
				CASE II	I	
(Read 7)						
Unloaded Motor Flag		FLG01	01-10	- - - - -	0	
Cube Curve Motor Load Calculation		FLG03	11-20	- - - - -	0	
Motor Load in KW vs TIME		FLG02 (Note 8)	21-30	- - - - -	2.1	STD

NOTES: 8. Use a "2" for defining a "Standard Motor". Data is not required.
 Omit Time and KW data below. If Motor Definition data is put in
 (above), it will not be used in any of the calculations.

NOTE: Punch (key in) ALL Motor Torque Data before any Load Torque Data.

	Column	TIME		Column	LOAD - KW
	(Read 8b1)			(Read 9b1)	
1	01-10	- - - - -		01-10	- - - - -
2	11-20	- - - - -		11-20	- - - - -
3	21-30	- - - - -		21-30	- - - - -
4	31-40	- - - - -		31-40	- - - - -
5	41-50	- - - - -		41-50	- - - - -
6	51-60	- - - - -		51-60	- - - - -
7	61-70	- - - - -		61-70	- - - - -
8	71-80	- - - - -		71-80	- - - - -
	(Read 8b2)	- - - - -		(Read 9b2)	- - - - -
9	01-10	- - - - -		01-10	- - - - -
10	11-20	- - - - -		11-20	- - - - -
11	21-30	- - - - -		21-30	- - - - -
12	31-40	- - - - -		31-40	- - - - -
13	41-50	- - - - -		41-50	- - - - -
14	51-60	- - - - -		51-60	- - - - -
15	61-70	- - - - -		61-70	- - - - -
16	71-80	- - - - -		71-80	- - - - -
	(Read 8b3)	- - - - -		(Read 9b3)	- - - - -
17	01-10	- - - - -		01-10	- - - - -
18	11-20	- - - - -		11-20	- - - - -
19	21-30	- - - - -		21-30	- - - - -
20	31-40	- - - - -		31-40	- - - - -
21	41-50	- - - - -		41-50	- - - - -

End of data for 1 step - enter a /* following the last percent load torque curve card for the last motor for each step. If this is the last step in the Program run, this data should be followed by two (2) cards, /*, /* (then /&). See sheet 2.

Cols 01-02 - 1*

LOAD DATA FOR STEP No. 11.

Sheet 2

Step Data - Any Number. Terminal Run with a /* card after the last step.

(Read 5)	Symbol	Columns	Loc A * #1 #2	MSLR #1 #2
Existing Load - KW	EKW	01-10	235d (2389)	2161 (2198)
Added Load - KW See Note 1	AKW	11-20	0-----	-----
In Rush Load - Motor Starting	SKVA	21-30	143-----	3732. (216)
Motor Horse Power-See Note 2 & 3	MHP1	31-40	25-----	635. (35)
New Time, Start of Step - Sec	NTM	41-50	92-----	-----

CASE I FF

NOTES: 1. For a load rejection (Off-Load) situation, the value should include a minus (-) sign; ie. -3000. Off loads may be used at any step in the program. If the last step, follow by /* card.

2. Input motor data using either Sheet 3 or 4. Sheet 3 is for cases where the motor torque vs speed (and load torque vs speed) data is known. Sheet 4 is used when the motor/load KW is in the form of KW vs TIME.
3. MHP1 should equal the total of the individual motor horsepowers (MHP2's from sheets 3 and/or 4) for each step.
4. Use FLG20 = 0 for the case of no accumulated resistive loading or when no effect is desired.
 If FLG20 = 1, program will use "existing load" plus "added KW Loading" in correcting for effect of voltage dip and overshoot.
 If FLG20 = 2, program will use "accumulated KW Loads" in correcting for the effect of voltage dip and overshoot.
5. For Turbocharged engines, for TURBO, input 1.
 For blower scavenged or naturally aspirated engines, input 0.
 For OP Turbo, input EXLF = 1. (Linear) or fit to suit curve.
 For PC Turbo, input EXLF = 2. (Exponential) or fit to suit.
 (For N/A or Blower Scavenged, EXLF is not used)
 For TCRF, input .7 for a decay rate of 50% in 2 seconds,
 or calculate factor as follows: (percent decay as a decimal)
 raised to the reciprocal of the time (in seconds) for that decay will give factor to put in as TCRF.

Use the following only if this is the last step of the program run:

End of Data - enter a /* as the last physical input card in the input stream - Cols 01-02 - - - - - / *.

NOTE: If input is by punch card, the last two data cards for any run, prior to the /* card (provided as part of the "Execute Job Control") should consist of at least one /* card.

MOTOR DATA FOR STEP No. 11, MOTOR No. 1.
 If this sheet is used, do not use a Sheet 3 for the same step.

Sheet 4

MOTOR DATA - Alternate Method - KW vs Time Data. See Sht 3 for Primary Method.

(Read 6)	Symbol	Columns	Value.	LocA	MSLR	
Motor Speed - RPM	MRPM	01-10	1800	1800	42	
Motor Inertia - Lb-Ft-Sqd	MWR2	11-20	25	25	66d	35.
Motor Horsepower	MHP2	21-30	25	25	635	35.
Motor Load in KW-Running Load	MLKW	31-40	21.1	21.1	464	29.
Motor Slip/Load Constant-Percent	XMRC (75%)	41-50	7Σ	7Σ		

(Read 7)	Symbol	Columns	Value.	CASE I	CASE II
Unloaded Motor Flag	FLG01	01-10	0	0	0
Cube Curve Motor Load Calculation	FLG03	11-20	0	0	0
Motor Load in KW vs TIME	FLG02 (Note 8)	21-30	2.1	2.1	STO

NOTES: 8. Use a "2" for defining a "Standard Motor". Data is not required.
 Omit Time and KW data below. If Motor Definition data is put in
 (above), it will not be used in any of the calculations.

NOTE: Punch (key in) ALL Motor Torque Data before any Load Torque Data.

	Column	TIME	Column	LOAD - KW
	(Read 8b1)		(Read 9b1)	
1	01-10	-----	01-10	-----
2	11-20	-----	11-20	-----
3	21-30	-----	21-30	-----
4	31-40	-----	31-40	-----
5	41-50	-----	41-50	-----
6	51-60	-----	51-60	-----
7	61-70	-----	61-70	-----
8	71-80	-----	71-80	-----
	(Read 8b2)	-----	(Read 9b2)	-----
9	01-10	-----	01-10	-----
10	11-20	-----	11-20	-----
11	21-30	-----	21-30	-----
12	31-40	-----	31-40	-----
13	41-50	-----	41-50	-----
14	51-60	-----	51-60	-----
15	61-70	-----	61-70	-----
16	71-80	-----	71-80	-----
	(Read 8b3)	-----	(Read 9b3)	-----
17	01-10	-----	01-10	-----
18	11-20	-----	11-20	-----
19	21-30	-----	21-30	-----
20	31-40	-----	31-40	-----
21	41-50	-----	41-50	-----

End of data for 1 step - enter a /* following the last percent load torque curve card for the last motor for each step. If this is the last step in the Program run, this data should be followed by two (2) cards, /*, /* (then /&). See sheet 2.

Cols 01-02 - /*.

LOAD DATA FOR STEP No. 12.

Step Data - Any Number.		Terminal Run with a /* card after the last step.			
	Symbol	Columns	Value	LocA	MSLR
(Read 5)	EKW	01-10	2321 (2410)	#1	#2
Existing Load - KW	AKW	11-20	83	\$	\$
Added Load - KW See Note 1	SKVA	21-30	158 - (623)	612	
In Rush Load - Motor Starting	MHP1	31-40	118 - (98)	92	
Motor Horse Power-See Note 2 & 3	NTM	41-50	120 -----		
New Time, Start of Step - Sec				CASE I	II

NOTES: 1. For a load rejection (Off-Load) situation, the value should include a minus (-) sign; ie. -3000. Off loads may be used at any step in the program. If the last step, follow by /* card.

2. Input motor data using either Sheet 3 or 4. Sheet 3 is for cases where the motor torque vs speed (and load torque vs speed) data is known. Sheet 4 is used when the motor/load KW is in the form of KW vs TIME.

3. MHP1 should equal the total of the individual motor horsepowers (MHP2's from sheets 3 and/or 4) for each step.

4. Use FLG20 = 0 for the case of no accumulated resistive loading or when no effect is desired.

If FLG20 = 1, program will use "existing load" plus "added KW Loading" in correcting for effect of voltage dip and overshoot.

If FLG20 = 2, program will use "accumulated KW Loads" in correcting for the effect of voltage dip and overshoot.

5. For Turbocharged engines, for TURBO, input 1.
 For blower scavenged or naturally aspirated engines, input 0.
 For OP Turbo, input EXLF = 1. (Linear) or fit to suit curve.
 For PC Turbo, input EXLF = 2. (Exponential) or fit to suit.
 (For N/A or Blower Scavenged, EXLF is not used)
 For TCRF, input .7 for a decay rate of 50% in 2 seconds,
 or calculate factor as follows: (percent decay as a decimal)
 raised to the reciprocal of the time (in seconds) for that decay
 will give factor to put in as TCRF.

Use the following only if this is the last step of the program run:

End of Data - enter a /* as the last physical input card in the input stream - Cols 01-02 ----- /*.

NOTE: If input is by punch card, the last two data cards for any run, prior to the /* card (provided as part of the "Execute Job Control") should consist of at least one /* card.

MOTOR DATA FOR STEP No. 12, MOTOR No. 1.

If this sheet is used, do not use a Sheet 3 for the same step.

Sheet 4

MOTOR DATA - Alternate Method - KW vs Time Data. See Sht 3 for Primary Method.

	Symbol	Columns	Value.	LocA	MSLR
(Read 6)		18-2	182	182	182
Motor Speed - RPM	MRPM	01-10	1800		
Motor Inertia - Lb-Ft-Sqd	MWR2	11-20	100		
Motor Horsepower	MHP2	21-30	118	(98)	97
Motor Load in KW-Running Load	MLKW	31-40	98	(81)	80
Motor Slip/Load Constant-Percent	XMRC (75%)	41-50	75		

CASE.T

	Symbol	Columns	Value.	LocA	MSLR
(Read 7)				CASE.I	
Unloaded Motor Flag	FLG01	01-10	0		
Cube Curve Motor Load Calculation	FLG03	11-20	0		
Motor Load in KW vs TIME	FLG02 (Note 8)	21-30	2		

NOTES: 8. Use a "2" for defining a "Standard Motor". Data is not required.
Omit Time and KW data below. If Motor Definition data is put in
(above), it will not be used in any of the calculations.

NOTE: Punch (key in) ALL Motor Torque Data before any Load Torque Data.

	Column	TIME		Column	LOAD - KW
	(Read 8b1)			(Read 9b1)	
1	01-10	-----		01-10	-----
2	11-20	-----		11-20	-----
3	21-30	-----		21-30	-----
4	31-40	-----		31-40	-----
5	41-50	-----		41-50	-----
6	51-60	-----		51-60	-----
7	61-70	-----		61-70	-----
8	71-80	-----		71-80	-----
	(Read 8b2)	-----		(Read 9b2)	-----
9	01-10	-----		01-10	-----
10	11-20	-----		11-20	-----
11	21-30	-----		21-30	-----
12	31-40	-----		31-40	-----
13	41-50	-----		41-50	-----
14	51-60	-----		51-60	-----
15	61-70	-----		61-70	-----
16	71-80	-----		71-80	-----
	(Read 8b3)	-----		(Read 9b3)	-----
17	01-10	-----		01-10	-----
18	11-20	-----		11-20	-----
19	21-30	-----		21-30	-----
20	31-40	-----		31-40	-----
21	41-50	-----		41-50	-----

End of data for 1 step - enter a /* following the last percent load torque curve card for the last motor for each step. If this is the last step in the Program run, this data should be followed by two (2) cards, /*, /* (then /&). See sheet 2.

Cols 01-02 - /*

/* end.

LOAD DATA FOR STEP No. Lop - 1.APPENDIX A
Sheet 2

-24-

Step Data - Any Number. Terminal Run with a /* card after the last step.

(Read 5)	Symbol	Columns	Value	#1	#2
Existing Load - KW	EKW	01-10	Φ	-	-
Added Load - KW See Note 1	AKW	11-20	246	-	-
In Rush Load - Motor Starting	SKVA	21-30	541500	1164	(1164)
Motor Horse Power-See Note 2 & 3	MHP1	31-40	81	(181)	-
New Time, Start of Step - Sec	NTM	41-50	Φ	-	-

NOTES: 1. For a load rejection (Off-Load) situation, the value should include a minus (-) sign; ie. -3000. Off loads may be used at any step in the program. If the last step, follow by /* card.

2. Input motor data using either Sheet 3 or 4. Sheet 3 is for cases where the motor torque vs speed (and load torque vs speed) data is known. Sheet 4 is used when the motor/load KW is in the form of KW vs TIME.
3. MHP1 should equal the total of the individual motor horsepowers (MHP2's from sheets 3 and/or 4) for each step.
4. Use FLG2Ø = 0 for the case of no accumulated resistive loading or when no effect is desired.
 If FLG2Ø = 1, program will use "existing load" plus "added KW Loading" in correcting for effect of voltage dip and overshoot.
 If FLG2Ø = 2, program will use "accumulated KW Loads" in correcting for the effect of voltage dip and overshoot.
5. For Turbocharged engines, for TURBO, input 1.
 For blower scavenged or naturally aspirated engines, input 0.
 For OP Turbo, input EXLF = 1. (Linear) or fit to suit curve.
 For PC Turbo, input EXLF = 2. (Exponential) or fit to suit.
 (For N/A or Blower Scavenged, EXLF is not used)
 For TCRF, input .7 for a decay rate of 50% in 2 seconds,
 or calculate factor as follows: (percent decay as a decimal)
 raised to the reciprocal of the time (in seconds) for that decay
 will give factor to put in as TCRF.

Use the following only if this is the last step of the program run:

End of Data - enter a /* as the last physical input card in the input stream - Cols 01-02 - - - - - / *.

NOTE: If input is by punch card, the last two data cards for any run, prior to the /* card (provided as part of the "Execute Job Control") should consist of at least one /* card.

MOTOR DATA FOR STEP No. L0P - 1, MOTOR No. 1.

Sheet 4

If this sheet is used, do not use a Sheet 3 for the same step.

MOTOR DATA - Alternate Method - KW vs Time Data. See Sht 3 for Primary Method.

(Read 6)	Symbol	Columns	Value.
Motor Speed - RPM	MRPM	01-10	<u>1800</u> -----
Motor Inertia - Lb-Ft-Sqd	MWR2	11-20	<u>260</u> -----
Motor Horsepower	MHP2	21-30	<u>81</u> ----- <u>(81.1)</u>
Motor Load in KW-Running Load	MLKW	31-40	<u>67</u> ----- <u>(150.0)</u>
Motor Slip/Load Constant-Percent	XMRC (75%)	41-50	<u>75</u> -----

(Read 7)

Unloaded Motor Flag	FLG01	01-10	----- <u>0</u> -----
Cube Curve Motor Load Calculation	FLG03	11-20	----- <u>0</u> -----
Motor Load in KW vs TIME	FLG02 (Note 8)	21-30	----- <u>2.21</u> ----- <u>STD</u>

NOTES: 8. Use a "2" for defining a "Standard Motor". Data is not required.
 Omit Time and KW data below. If Motor Definition data is put in
 (above), it will not be used in any of the calculations.

NOTE: Punch (key in) ALL Motor Torque Data before any Load Torque Data.

	Column	TIME	Column	LOAD - KW
	(Read 8b1)		(Read 9b1)	
1	01-10	-----	01-10	-----
2	11-20	-----	11-20	-----
3	21-30	-----	21-30	-----
4	31-40	-----	31-40	-----
5	41-50	-----	41-50	-----
6	51-60	-----	51-60	-----
7	61-70	-----	61-70	-----
8	71-80	-----	71-80	-----
	(Read 8b2)	-----	(Read 9b2)	-----
9	01-10	-----	01-10	-----
10	11-20	-----	11-20	-----
11	21-30	-----	21-30	-----
12	31-40	-----	31-40	-----
13	41-50	-----	41-50	-----
14	51-60	-----	51-60	-----
15	61-70	-----	61-70	-----
16	71-80	-----	71-80	-----
	(Read 8b3)	-----	(Read 9b3)	-----
17	01-10	-----	01-10	-----
18	11-20	-----	11-20	-----
19	21-30	-----	21-30	-----
20	31-40	-----	31-40	-----
21	41-50	-----	41-50	-----

End of data for 1 step - enter a /* following the last percent load torque curve card for the last motor for each step. If this is the last step in the Program run, this data should be followed by two (2) cards, /*, /* (then /&). See sheet 2.

Cols 01-02 - /*

use notes data same as
Step 2 for LOCA/MSLA

Sheet 2

LOAD DATA FOR STEP No. LOP-2.

Step Data - Any Number. Terminal Run with a /* card after the last step.

(Read 5)	Symbol	Columns	Value	#1	#2
Existing Load - KW	EKW	01-10	313	396	(396)
Added Load - KW See Note 1	AKW	11-20	0	-----	-----
In Rush Load - Motor Starting	SKVA	21-30	4921	-----	-----
Motor Horse Power-See Note 2 & 3	MHP1	31-40	800	-----	-----
New Time, Start of Step - Sec	NTM	41-50	4.5	0.5	5.5

NOTES: 1. For a load rejection (Off-Load) situation, the value should include a minus (-) sign; ie. -3000. Off loads may be used at any step in the program. If the last step, follow by /* card.

2. Input motor data using either Sheet 3 or 4. Sheet 3 is for cases where the motor torque vs speed (and load torque vs speed) data is known. Sheet 4 is used when the motor/load KW is in the form of KW vs TIME.
3. MHP1 should equal the total of the individual motor horsepower (MHP2's from sheets 3 and/or 4) for each step.
4. Use FLG20 = 0 for the case of no accumulated resistive loading or when no effect is desired.
 If FLG20 = 1, program will use "existing load" plus "added KW Loading" in correcting for effect of voltage dip and overshoot.
 If FLG20 = 2, program will use "accumulated KW Loads" in correcting for the effect of voltage dip and overshoot.
5. For Turbocharged engines, for TURBO, input 1.
 For blower scavenged or naturally aspirated engines, input 0.
 For OP Turbo, input EXLF = 1. (Linear) or fit to suit curve.
 For PC Turbo, input EXLF = 2. (Exponential) or fit to suit.
 (For N/A or Blower Scavenged, EXLF is not used)
 For TCRF, input .7 for a decay rate of 50% in 2 seconds,
 or calculate factor as follows: (percent decay as a decimal)
 raised to the reciprocal of the time (in seconds) for that decay will give factor to put in as TCRF.

Use the following only if this is the last step of the program run:

End of Data - enter a /* as the last physical input card in the input stream - Cols 01-02 ----- /*.

NOTE: If input is by punch card, the last two data cards for any run, prior to the /* card (provided as part of the "Execute Job Control") should consist of at least one /* card.

LOAD DATA FOR STEP No. LOP-3.

Sheet 2

Step Data - Any Number. Terminal Run with a /* card after the last step.

(Read 5)	Symbol	Columns	Value
Existing Load - KW	EKW	01-10	(1018) -- 935
Added Load - KW See Note 1	AKW	11-20	0
In Rush Load - Motor Starting	SKVA	21-30	(2954) -- 2623
Motor Horse Power-See Note 2 & 3	MHP1	31-40	(500) -- 450
New Time, Start of Step - Sec	NTM	41-50	1Σ -----

NOTES: 1. For a load rejection (Off-Load) situation, the value should include a minus (-) sign; ie. -3000. Off loads may be used at any step in the program. If the last step, follow by /* card.

2. Input motor data using either Sheet 3 or 4. Sheet 3 is for cases where the motor torque vs speed (and load torque vs speed) data is known. Sheet 4 is used when the motor/load KW is in the form of KW vs TIME.
3. MHP1 should equal the total of the individual motor horsepowers (MHP2's from sheets 3 and/or 4) for each step.
4. Use FLG2Ø = Ø for the case of no accumulated resistive loading or when no effect is desired.
 If FLG2Ø = 1, program will use "existing load" plus "added KW Loading" in correcting for effect of voltage dip and overshoot.
 If FLG2Ø = 2, program will use "accumulated KW Loads" in correcting for the effect of voltage dip and overshoot.
5. For Turbocharged engines, for TURBO, input 1.
 For blower scavenged or naturally aspirated engines, input Ø.
 For OP Turbo, input EXLF = 1. (Linear) or fit to suit curve.
 For PC Turbo, input EXLF = 2. (Exponential) or fit to suit.
 (For N/A or Blower Scavenged, EXLF is not used)
 For TCRF, input .7 for a decay rate of 50% in 2 seconds,
 or calculate factor as follows: (present decay as a decimal)
 raised to the reciprocal of the time (in seconds) for that decay
 will give factor to put in as TCRF.

Use the following only if this is the last step of the program run:

End of Data - enter a /* as the last physical input card in the input stream - Cols 01-02 ----- /*.

NOTE: If input is by punch card, the last two data cards for any run, prior to the /* card (provided as part of the "Execute Job Control") should consist of at least one /* card.

LOAD DATA FOR STEP No. 200-4/5

Sheet 2

Step Data - Any Number. Terminal Run with a /* card after the last step.

(Read 5)	Symbol	Columns	Value	STEP 4	1 a 2	STEP 5
Existing Load - KW	EKW	01-10	1287 (1320)	1287 (1320)	1352 (1435)	
Added Load - KW See Note 1	AKW	11-20	0	0	-----	
In Rush Load - Motor Starting	SKVA	21-30	536000	536000	-----	
Motor Horse Power-See Note 2 & 3	MHP1	31-40	105	105	-----	
New Time, Start of Step - Sec	NTM	41-50	50	50	60	

use motor
data from
LocA/MSL
STEPS 7&8

- NOTES:
1. For a load rejection (Off-Load) situation, the value should include a minus (-) sign; ie. -3000. Off loads may be used at any step in the program. If the last step, follow by /* card.
 2. Input motor data using either Sheet 3 or 4. Sheet 3 is for cases where the motor torque vs speed (and load torque vs speed) data is known. Sheet 4 is used when the motor/load KW is in the form of KW vs TIME.
 3. MHP1 should equal the total of the individual motor horsepowers (MHP2's from sheets 3 and/or 4) for each step.
 4. Use FLG20 = 0 for the case of no accumulated resistive loading or when no effect is desired.
 If FLG20 = 1, program will use "existing load" plus "added KW Loading" in correcting for effect of voltage dip and overshoot.
 If FLG20 = 2, program will use "accumulated KW Loads" in correcting for the effect of voltage dip and overshoot.
 5. For Turbocharged engines, for TURBO, input 1.
 For blower scavenged or naturally aspirated engines, input 0.
 For OP Turbo, input EXLF = 1. (Linear) or fit to suit curve.
 For PC Turbo, input EXLF = 2. (Exponential) or fit to suit.
 (For N/A or Blower Scavenged, EXLF is not used)
 For TCRF, input .7 for a decay rate of 50% in 2 seconds,
 or calculate factor as follows: (percent decay as a decimal)
 raised to the reciprocal of the time (in seconds) for that decay
 will give factor to put in as TCRF.

Use the following only if this is the last step of the program run:

End of Data - enter a /* as the last physical
input card in the input stream - Cols 01-02 - - - - - /*.

NOTE: If input is by punch card, the last two data cards for any run, prior to the /* card (provided as part of the "Execute Job Control") should consist fo at leat one /* card.

LOAD DATA FOR STEP No. LOP-6.

Step Data - Any Number. Terminal Run with a /* card after the last step.

	Symbol	Columns	Value
(Read 5)	EKW	01-10	<u>1417</u> <u> </u> (1500)
Existing Load - KW	AKW	11-20	<u>0</u> <u> </u>
Added Load - KW See Note 1	SKVA	21-30	<u>243</u> <u> </u> (527)
In Rush Load - Motor Starting	MHP1	31-40	<u>40</u> <u> </u> (90)
Motor Horse Power-See Note 1 & 3	NTM	41-50	<u>20</u> <u> </u>
New Time, Start of Step - Sec			

NOTES: 1. For a load rejection (Off-Load) situation, the value should include a minus (-) sign; ie. -3000. Off loads may be used at any step in the program. If the last step, follow by /* card.

2. Input motor data using either Sheet 3 or 4. Sheet 3 is for cases where the motor torque vs speed (and load torque vs speed) data is known. Sheet 4 is used when the motor/load KW is in the form of KW vs TIME.

3. MHP1 should equal the total of the individual motor horsepowers (MHP2's from sheets 3 and/or 4) for each step.

4. Use FLG20 = 0 for the case of no accumulated resistive loading or when no effect is desired.

If FLG20 = 1, program will use "existing load" plus "added KW Loading" in correcting for effect of voltage dip and overshoot.
If FLG20 = 2, program will use "accumulated KW Loads" in correcting for the effect of voltage dip and overshoot.

5. For Turbocharged engines, for TURBO, input 1.

For blower scavenged or naturally aspirated engines, input 0.

For OP Turbo, input EXLF = 1. (Linear) or fit to suit curve.

For PC Turbo, input EXLF = 2. (Exponential) or fit to suit.

(For N/A or Blower Scavenged, EXLF is not used)

For TCRF, input .7 for a decay rate of 50% in 2 seconds,

or calculate factor as follows: (percent decay as a decimal)
raised to the reciprocal of the time (in seconds) for that decay
will give factor to put in as TCRF.

Use the following only if this is the last step of the program run:

End of Data - enter a /* as the last physical
input card in the input stream - Cols 01-02 - - - - - / *.

NOTE: If input is by punch card, the last two data cards for any run,
prior to the /* card (provided as part of the "Execute Job Control")
should consist of at least one /* card.

MOTOR DATA FOR STEP No. L0P-6, MOTOR No. 1.

Sheet 4

If this sheet is used, do not use a Sheet 3 for the same step.

MOTOR DATA - Alternate Method - KW vs Time Data. See Sht 3 for Primary Method.

(Read 6)	Symbol	Columns	Value.
Motor Speed - RPM	MRPM	01-10	<u>1800</u> -----
Motor Inertia - Lb-Ft-Sqd	MWR2	11-20	<u>120</u> -----
Motor Horsepower	MHP2	21-30	<u>40</u> -----
Motor Load in KW-Running Load	MLKW	31-40	<u>33</u> -----
Motor Slip/Load Constant-Percent	XMRG (75%)	41-50	<u>75</u> -----

(Read 7)

Unloaded Motor Flag	FLG01	01-10	-----
Cube Curve Motor Load Calculation	FLG03	11-20	-----
Motor Load in KW vs TIME	FLG02 (Note 8)	21-30	<u>2.1</u> ----- <u>STD</u>

NOTES: 8. Use a "2" for defining a "Standard Motor". Data is not required.
 Omit Time and KW data below. If Motor Definition data is put in
 (above), it will not be used in any of the calculations.

NOTE: Punch (key in) ALL Motor Torque Data before any Load Torque Data.

	Column (Read 8b1)	TIME	Column (Read 9b1)	LOAD - KW
1	01-10	-----	01-10	-----
2	11-20	-----	11-20	-----
3	21-30	-----	21-30	-----
4	31-40	-----	31-40	-----
5	41-50	-----	41-50	-----
6	51-60	-----	51-60	-----
7	61-70	-----	61-70	-----
8	71-80	-----	71-80	-----
	(Read 8b2)	-----	(Read 9b2)	-----
9	01-10	-----	01-10	-----
10	11-20	-----	11-20	-----
11	21-30	-----	21-30	-----
12	31-40	-----	31-40	-----
13	41-50	-----	41-50	-----
14	51-60	-----	51-60	-----
15	61-70	-----	61-70	-----
16	71-80	-----	71-80	-----
	(Read 8b3)	-----	(Read 9b3)	-----
17	01-10	-----	01-10	-----
18	11-20	-----	11-20	-----
19	21-30	-----	21-30	-----
20	31-40	-----	31-40	-----
21	41-50	-----	41-50	-----

End of data for 1 step - enter a /* following the last percent load torque curve card for the last motor for each step. If this is the last step in the Program run, this data should be followed by two (2) cards, /*, /* (then /&). See sheet 2.

Cols 01-02 - /*.

LOAD DATA FOR STEP No. LOP-7.

Sheet 2

Step Data - Any Number. Terminal Run with a /* card after the last step.

			#1	#2
(Read 5)	Symbol	Columns	Value	
Existing Load - KW	EKW	01-10	<u>1450</u>	<u>(1575)</u>
Added Load - KW See Note 1	AKW	11-20	<u>0</u>	<u>(218)</u>
In Rush Load - Motor Starting	SKVA	21-30	<u>254</u>	<u>(218)</u>
Motor Horse Power-See Note 2 & 3	MHP1	31-40	<u>32</u>	<u>(132)</u>
New Time, Start of Step - Sec	NTM	41-50	<u>80</u>	

NOTES: 1. For a load rejection (Off-Load) situation, the value should include a minus (-) sign; ie. -3000. Off loads may be used at any step in the program. If the last step, follow by /* card.

2. Input motor data using either Sheet 3 or 4. Sheet 3 is for cases where the motor torque vs speed (and load torque vs speed) data is known. Sheet 4 is used when the motor/load KW is in the form of KW vs TIME.
3. MHP1 should equal the total of the individual motor horsepowers (MHP2's from sheets 3 and or 4) for each step.
4. Use FLG20 = 0 for the case of no accumulated resistive loading or when no effect is desired.
If FLG20 = 1, program will use "existing load" plus "added KW Loading" in correcting for effect of voltage dip and overshoot.
If FLG20 = 2, program will use "accumulated KW Loads" in correcting for the effect of voltage dip and overshoot.
5. For Turbocharged engines, for TURBO, input 1.
For blower scavenged or naturally aspirated engines, input 0.
For OP Turbo, input EXLF = 1. (Linear) or fit to suit curve.
For PC Turbo, input EXLF = 2. (Exponential) or fit to suit.
(For N/A or Blower Scavenged, EXLF is not used)
For TCRF, input .7 for a decay rate of 50% in 2 seconds,
or calculate factor as follows: (present decay as a decimal)
raised to the reciprocal of the time (in seconds) for that decay
will give factor to put in as TCRF.

Use the following only if this is the last step of the program run:

End of Data - enter a /* as the last physical
input card in the input stream - Cols 01-02 - - - - - /*.

NOTE: If input is by punch card, the last two data cards for any run, prior to the /* card (provided as part of the "Execute Job Control") should consist of at least one /* card.

MOTOR DATA FOR STEP No. L0A-7, MOTOR No. 1.

Sheet 4

If this sheet is used, do not use a Sheet 3 for the same step.

MOTOR DATA - Alternate Method - KW vs Time Data. See Sht 3 for Primary Method.

(Read 6)	Symbol	Columns	Value.
Motor Speed - RPM	MRPM	01-10	<u>1800</u> -----
Motor Inertia - Lb-Ft-Sqd	MWR2	11-20	<u>100</u> -----
Motor Horsepower	MHP2	21-30	<u>37</u> ----- (3 1/2)
Motor Load in KW-Running Load	MLKW	31-40	<u>31</u> ----- (2 1/2)
Motor Slip/Load Constant-Percent	XMRC (75%)	41-50	<u>75</u> -----

(Read 7)

Unloaded Motor Flag	FLG01	01-10	----- 0
Cube Curve Motor Load Calculation	FLG03	11-20	----- 0
Motor Load in KW vs TIME	FLG02 (Note 8)	21-30	----- 2.1

STO

NOTES: 8. Use a "2" for defining a "Standard Motor". Data is not required.
 Omit Time and KW data below. If Motor Definition data is put in
 (above), it will not be used in any of the calculations.

NOTE: Punch (key in) ALL Motor Torque Data before any Load Torque Data.

	Column (Read 8b1)	TIME	Column (Read 9b1)	LOAD - KW
1	01-10	-----	01-10	-----
2	11-20	-----	11-20	-----
3	21-30	-----	21-30	-----
4	31-40	-----	31-40	-----
5	41-50	-----	41-50	-----
6	51-60	-----	51-60	-----
7	61-70	-----	61-70	-----
8	71-80	-----	71-80	-----
	(Read 8b2)	-----	(Read 9b2)	-----
9	01-10	-----	01-10	-----
10	11-20	-----	11-20	-----
11	21-30	-----	21-30	-----
12	31-40	-----	31-40	-----
13	41-50	-----	41-50	-----
14	51-60	-----	51-60	-----
15	61-70	-----	61-70	-----
16	71-80	-----	71-80	-----
	(Read 8b3)	-----	(Read 9b3)	-----
17	01-10	-----	01-10	-----
18	11-20	-----	11-20	-----
19	21-30	-----	21-30	-----
20	31-40	-----	31-40	-----
21	41-50	-----	41-50	-----

End of data for 1 step - enter a /* following the last percent load torque curve card for the last motor for each step. If this is the last step in the Program run, this data should be followed by two (2) cards, /*, /* (then /&). See sheet 2.

Cols 01-02 - /*.

LOAD DATA FOR STEP No. Lop-8.

Sheet 2

Step Data - Any Number. Terminal Run with a /* card after the last step.

		Symbol	Columns	#1	#2
(Read 5)					
Existing Load - KW		EKW	01-10	148L	(1602)
Added Load - KW See Note 1		AKW	11-20	0	---
In Rush Load - Motor Starting		SKVA	21-30	3583	(675)
Motor Horse Power-See Note 2 & 3		MHP1	31-40	610	(10)
New Time, Start of Step - Sec		NTM	41-50	90	-----

NOTES: 1. For a load rejection (Off-Load) situation, the value should include a minus (-) sign; ie. -3000. Off loads may be used at any step in the program. If the last step, follow by /* card.

2. Input motor data using either Sheet 3 or 4. Sheet 3 is for cases where the motor torque vs speed (and load torque vs speed) data is known. Sheet 4 is used when the motor/load KW is in the form of KW vs TIME.
3. MHP1 should equal the total of the individual motor horsepowers (MHP2's from sheets 3 and/or 4) for each step.
4. Use FLG20 = 0 for the case of no accumulated resistive loading or when no effect is desired.
If FLG20 = 1, program will use "existing load" plus "added KW Loading" in correcting for effect of voltage dip and overshoot.
If FLG20 = 2, program will use "accumulated KW Loads" in correcting for the effect of voltage dip and overshoot.
5. For Turbocharged engines, for TURBO, input 1.
For blower scavenged or naturally aspirated engines, input 0.
For OP Turbo, input EXLF = 1. (Linear) or fit to suit curve.
For PC Turbo, input EXLF = 2. (Exponential) or fit to suit.
(For N/A or Blower Scavenged, EXLF is not used)
For TCRF, input .7 for a decay rate of 50% in 2 seconds,
or calculate factor as follows: (percent decay as a decimal)
raised to the reciprocal of the time (in seconds) for that decay
will give factor to put in as TCRF.

Use the following only if this is the last step of the program run:

End of Data - enter a /* as the last physical
input card in the input stream - Cols 01-02 ----- /*.

NOTE: If input is by punch card, the last two data cards for any run, prior to the /* card (provided as part of the "Execute Job Control") should consist of at least one /* card.

MOTOR DATA FOR STEP No. LOP-B, MOTOR No. .
 If this sheet is used, do not use a Sheet 3 for the same step.

Sheet 4

MOTOR DATA - Alternate Method - KW vs Time Data. See Sht 3 for Primary Method.

(Read 6)	Symbol	Columns	#1	#2
Motor Speed - RPM	MRP1	01-10	1800	- - - - -
Motor Inertia - Lb-Ft-Sqd	MWR2	11-20	500	- - - - -
Motor Horsepower	MHP2	21-30	610	- - - - -
Motor Load in KW-Running Load	MLKW	31-40	443	- - - - -
Motor Slip/Load Constant-Percent	XMRG (75%)	41-50	75	- - - - -

(Read 7)

Unloaded Motor Flag	FLG01	01-10	- - - - -	0
Cube Curve Motor Load Calculation	FLG03	11-20	- - - - -	0
Motor Load in KW vs TIME	FLG02 (Note 8)	21-30	- - - - -	2 - 1 STD

NOTES: 8. Use a "2" for defining a "Standard Motor". Data is not required.
 Omit Time and KW data below. If Motor Definition data is put in
 (above), it will not be used in any of the calculations.

NOTE: Punch (key in) ALL Motor Torque Data before any Load Torque Data.

Column	TIME	Column	LOAD - KW
(Read 8b1)		(Read 9b1)	
1	01-10	01-10	- - - - -
2	11-20	11-20	- - - - -
3	21-30	21-30	- - - - -
4	31-40	31-40	- - - - -
5	41-50	41-50	- - - - -
6	51-60	51-60	- - - - -
7	61-70	61-70	- - - - -
8	71-80	71-80	- - - - -
	(Read 8b2)	(Read 9b2)	
9	01-10	01-10	- - - - -
10	11-20	11-20	- - - - -
11	21-30	21-30	- - - - -
12	31-40	31-40	- - - - -
13	41-50	41-50	- - - - -
14	51-60	51-60	- - - - -
15	61-70	61-70	- - - - -
16	71-80	71-80	- - - - -
	(Read 8b3)	(Read 9b3)	
17	01-10	01-10	- - - - -
18	11-20	11-20	- - - - -
19	21-30	21-30	- - - - -
20	31-40	31-40	- - - - -
21	41-50	41-50	- - - - -

End of data for 1 step - enter a /* following the last percent load torque curve card for the last motor for each step. If this is the last step in the Program run, this data should be followed by two (2) cards, /*, /* (then /&). See sheet 2.

Cols 01-02 - - /*.

LOAD DATA FOR STEP No. Loop-9.

Sheet 2

Step Data - Any Number. Terminal Run with a /* card after the last step.

(Read 5)	Symbol	Columns	Value	#1	#2
Existing Load - KW	EKW	01-10	192 3 ⁴	192 3 ⁴	(1610)
Added Load - KW See Note 1	AKW	11-20	207.	207.	
In Rush Load - Motor Starting	SKVA	21-30	702 67442	702 67442	
Motor Horse Power-See Note 2 & 3	MHP1	31-40	107.	107.	
New Time, Start of Step - Sec	NTM	41-50	120.	120.	

NOTES: 1. For a load rejection (Off-Load) situation, the value should include a minus (-) sign; ie. -3000. Off loads may be used at any step in the program. If the last step, follow by /* card.

2. Input motor data using either Sheet 3 or 4. Sheet 3 is for cases where the motor torque vs speed (and load torque vs speed) data is known. Sheet 4 is used when the motor/load KW is in the form of KW vs TIME.
3. MHP1 should equal the total of the individual motor horsepowers (MHP2's from sheets 3 and/or 4) for each step.
4. Use FLG20 = 0 for the case of no accumulated resistive loading or when no effect is desired.
If FLG20 = 1, program will use "existing load" plus "added KW Loading" in correcting for effect of voltage dip and overshoot.
If FLG20 = 2, program will use "accumulated KW Loads" in correcting for the effect of voltage dip and overshoot.
5. For Turbocharged engines, for TURBO, input 1.
For blower scavenged or naturally aspirated engines, input 0.
For OP Turbo, input EXLF = 1. (Linear) or fit to suit curve.
For PC Turbo, input EXLF = 2. (Exponential) or fit to suit.
(For N/A or Blower Scavenged, EXLF is not used)
For TCRF, input .7 for a decay rate of 50% in 2 seconds,
or calculate factor as follows: (percent decay as a decimal)
raised to the reciprocal of the time (in seconds) for that decay
will give factor to put in as TCRF.

Use the following only if this is the last step of the program run:

End of Data - enter a /* as the last physical
input card in the input stream - Cols 01-02 - - - - - /*.

NOTE: If input is by punch card, the last two data cards for any run, prior to the /* card (provided as part of the "Execute Job Control") should consist fo at leat one /* card.

MOTOR DATA FOR STEP No. LOP-9, MOTOR No. 1.
 If this sheet is used, do not use a Sheet 3 for the same step.

Sheet 4

MOTOR DATA - Alternate Method - KW vs Time Data. See Sht 3 for Primary Method.

(Read 6)	Symbol	Columns	Value.
Motor Speed - RPM	MRPM	01-10	<u>1800</u> .
Motor Inertia - Lb-Ft-Sqd	MWR2	11-20	<u>100</u> -----
Motor Horsepower	MHP2	21-30	<u>107</u> -----
Motor Load in KW-Running Load	MLKW	31-40	<u>60</u> -----
Motor Slip/Load Constant-Percent	XMRG (75%)	41-50	<u>75</u> -----

(Read 7)

Unloaded Motor Flag	FLG01	01-10	-----	0
Cube Curve Motor Load Calculation	FLG03	11-20	-----	0
Motor Load in KW vs TIME	FLG02 (Note 8)	21-30	-----	<u>2.1</u> <u>STD.</u>

NOTES: 8. Use a "2" for defining a "Standard Motor". Data is not required.

Omit Time and KW data below. If Motor Definition data is put in
(above), it will not be used in any of the calculations.NOTE: Punch (key in) All Motor Torque Data before any Load Torque Data.

	Column	TIME	Column	LOAD - KW
	(Read 8b1)		(Read 9b1)	
1	01-10	-----	01-10	-----
2	11-20	-----	11-20	-----
3	21-30	-----	21-30	-----
4	31-40	-----	31-40	-----
5	41-50	-----	41-50	-----
6	51-60	-----	51-60	-----
7	61-70	-----	61-70	-----
8	71-80	-----	71-80	-----
	(Read 8b2)	-----	(Read 9b2)	-----
9	01-10	-----	01-10	-----
10	11-20	-----	11-20	-----
11	21-30	-----	21-30	-----
12	31-40	-----	31-40	-----
13	41-50	-----	41-50	-----
14	51-60	-----	51-60	-----
15	61-70	-----	61-70	-----
16	71-80	-----	71-80	-----
	(Read 8b3)	-----	(Read 9b3)	-----
17	01-10	-----	01-10	-----
18	11-20	-----	11-20	-----
19	21-30	-----	21-30	-----
20	31-40	-----	31-40	-----
21	41-50	-----	41-50	-----

End of data for 1 step - enter a /* following the last percent load torque curve card for the last motor for each step. If this is the last step in the Program run, this data should be followed by two (2) cards, /*, /* (then /&). See sheet 2.

Cols 01-02 - /*

/* END .

LOAD DATA FOR STEP No. 1.

Step Data - Any Number. Terminal Run with a /* card after the last step.

(Read 5)	Symbol	Columns	Value	use motors from LocA Steps.
Existing Load - KW	EKW	01-10	1444-----	
Added Load - KW See Note 1	AKW	11-20	0-----	
I ₁ Rush Load - Motor Starting	SKVA	21-30	3229-----	
Motor Horse Power-See Note 2 & 3	MHP1	31-40	6052-----	
New Time, Start of Step - Sec	NTM	41-50	0-----	

NOTES: 1. For a load rejection (Off-Load) situation, the value should include a minus (-) sign; ie. -3000. Off loads may be used at any step in the program. If the last step, follow by /* card.

~~586~~ -
150 HP
+
455HP

2. Input motor data using either Sheet 3 or 4. Sheet 3 is for cases where the motor torque vs speed (and load torque vs speed) data is known. Sheet 4 is used when the motor/load KW is in the form of KW vs TIME.
3. MHP1 should equal the total of the individual motor horsepower (MHP2's from sheets 3 and/or 4) for each step.
4. Use FLG20 = 0 for the case of no accumulated resistive loading or when no effect is desired.
If FLG20 = 1, program will use "existing load" plus "added KW Loading" in correcting for effect of voltage dip and overshoot.
If FLG20 = 2, program will use "accumulated KW Loads" in correcting for the effect of voltage dip and overshoot.
5. For Turbocharged engines, for TURBO, input 1.
For blower scavenged or naturally aspirated engines, input 0.
For OP Turbo, input EXLF = 1. (Linear) or fit to suit curve.
For PC Turbo, input EXLF = 2. (Exponential) or fit to suit.
(For N/A or Blower Scavenged, EXLF is not used)
For TCRF, input .7 for a decay rate of 50% in 2 seconds,
or calculate factor as follows: (percent decay as a decimal)
raised to the reciprocal of the time (in seconds) for that decay
will give factor to put in as TCRF.

Use the following only if this is the last step of the program run:

End of Data - enter a /* as the last physical
input card in the input stream - Cols 01-02 - - - - - /*.

NOTE: If input is by punch card, the last two data cards for any run, prior to the /* card (provided as part of the "Execute Job Control") should consist of at least one /* card.

LOAD DATA FOR STEP No. 2.

Sheet 2

Step Data - Any Number. Terminal Run with a /* card after the last step.

(Read 5)	Symbol	Columns	Value
Existing Load - KW	EKW	01-10	<u>2125</u>
Added Load - KW See Note 1	AKW	11-20	<u>Ø</u>
In Rush Load - Motor Starting	SKVA	21-30	<u>4004</u>
Motor Horse Power-See Note 2 & 3	MHP1	31-40	<u>676</u>
New Time, Start of Step - Sec	NTM	41-50	<u>Ø</u>

USE
Std.
MOTOR

NOTES: 1. For a load rejection (Off-Load) situation, the value should include a minus (-) sign; ie. -3000. Off loads may be used at any step in the program. If the last step, follow by /* card.

2. Input motor data using either Sheet 3 or 4. Sheet 3 is for cases where the motor torque vs speed (and load torque vs speed) data is known. Sheet 4 is used when the motor/load KW is in the form of KW vs TIME. 1800 RPM
600 WRZ
676 HP
498 LOAD
3. MHP1 should equal the total of the individual motor horsepowers (MHP2's from sheets 3 and/or 4) for each step. 75
4. Use FLG2Ø = Ø for the case of no accumulated resistive loading or when no effect is desired.
If FLG2Ø = 1, program will use "existing load" plus "added KW Loading" in correcting for effect of voltage dip and overshoot.
If FLG2Ø = 2, program will use "accumulated KW Loads" in correcting for the effect of voltage dip and overshoot. Ø
Ø
2.
5. For Turbocharged engines, for TURBO, input 1.
For blower scavenged or naturally aspirated engines, input Ø.
For OP Turbo, input EXLF = 1. (Linear) or fit to suit curve.
For PC Turbo, input EXLF = 2. (Exponential) or fit to suit.
(For N/A or Blower Scavenged, EXLF is not used)
For TCRF, input .7 for a decay rate of 50% in 2 seconds,
or calculate factor as follows: (percent decay as a decimal)
raised to the reciprocal of the time (in seconds) for that decay
will give factor to put in as TCRF.

Use the following only if this is the last step of the program run:

End of Data - enter a /* as the last physical
input card in the input stream - Cols 01-02 - - - - - /*.

NOTE: If input is by punch card, the last two data cards for any run, prior to the /* card (provided as part of the "Execute Job Control") should consist fo at least one /* card.

LOAD DATA FOR STEP No. 3.

Sheet 2

Step Data - Any Number. Terminal Run with a /* card after the last step.

(Read 5)	Symbol	Columns	Value
Existing Load - KW	EKW	01-10	1450 -----
Added Load - KW See Note 1	AKW	11-20	0 -----
In Rush Load - Motor Starting	SKVA	21-30	3828 -----
Motor Horse Power-See Note 2 & 3	MHP1	31-40	646 -----
New Time, Start of Step - Sec	NTM	41-50	0 -----

NOTES: 1. For a load rejection (Off-Load) situation, the value should include a minus (-) sign; ie. -3000. Off loads may be used at any step in the program. If the last step, follow by /* card.

use
Std.
motors-

1800RPM
600WR²
646HP
473KwLo

75.

2. Input motor data using either Sheet 3 or 4. Sheet 3 is for cases where the motor torque vs speed (and load torque vs speed) data is known. Sheet 4 is used when the motor/load KW is in the form of KW vs TIME.

0
4
2.

3. MHP1 should equal the total of the individual motor horsepower (MHP2's from sheets 3 and/or 4) for each step.

4. Use FLG20 = 0 for the case of no accumulated resistive loading or when no effect is desired.

If FLG20 = 1, program will use "existing load" plus "added KW Loading" in correcting for effect of voltage dip and overshoot.
If FLG20 = 2, program will use "accumulated KW Loads" in correcting for the effect of voltage dip and overshoot.

5. For Turbocharged engines, for TURBO, input 1.

For blower scavenged or naturally aspirated engines, input 0.

For OP Turbo, input EXLF = 1. (Linear) or fit to suit curve.

For PC Turbo, input EXLF = 2. (Exponential) or fit to suit.

(For N/A or Blower Scavenged, EXLF is not used)

For TCRF, input .7 for a decay rate of 50% in 2 seconds,
or calculate factor as follows: (percent decay as a decimal)
raised to the reciprocal of the time (in seconds) for that decay
will give factor to put in as TCRF.

Use the following only if this is the last step of the program run:

End of Data - enter a /* as the last physical
input card in the input stream - Cols 01-02 -----

/*

end ALL

NOTE: If input is by punch card, the last two data cards for any run, prior to the /* card (provided as part of the "Execute Job Control") should consist of at least one /* card.

1. 100000 FREQUENCY AND VOLTAGE EXCITATION PREDICTIONS PROGRAM LINE 1

2. ENGINE RATED AT 2870.0 KW AT 600.0 RPM OF 12. CYLINDERS? 2. STROKES PER CYCLE
3. WITH CAPABILITY OF 120.0 PERCENT LOAD, AND WITH 34572. LB-FT-1-STEP INERTIA.

4. GENERATOR RATED AT 4063. KW AND HAS THE FOLLOWING PROPERTIES:

5. 1. NO LOAD FIELD REACTANCE 15.00 PERCENT
6. 2. NO LOAD FIELD VOLTAGE 5.00 SECONDS
7. 3. MAXIMUM FIELD VOLTAGE 45.0 VOLTS
8. 4. CORRECTED SUB-TRANSIENT REACTANCE IS 21.93 PERCENT

9. THE POINT FOR DEFINITION OF RECOVERY FOR VOLTAGE IS 90. PERCENT AND FOR FREQUENCY IS 93. PERCENT

10. THE FOLLOWING CONSTANTS ARE BEING USED FOR THESE COMPUTATIONS:

11. GENERATOR DIP CONSTANT 1687.
12. EXCITER RECOVERY RATE 5.00
13. ACCELERATION CONSTANT 32.0
14. NO LOAD LOAD FACTOR IS 0.510
15. LOAD RECOVERY RATE IS 0.250 PER SECOND
16. THE TIME INCREMENT IN THE CALCULATION IS 0.05 SECONDS
17. VOLTAGE OVERTHREAD CONSTANT IS 0.10 SECONDS
18. FLAG 20 SET 0.2
19. BLACK DEAD LINE CONSTANT IS 0.0270
20. GOVERNOR DECAY RATIO IS 0.0000 GOVERNOR DECAY RATIO IS 0.1000
21. ACCELERATION CONSTANT AC2 = 0.0014000366 ENGINE COV DEAD LINE 0.376321336

22. SINCE NO 1 LINE SWINGING LINE IS 0.0 SECONDS

23. USING THE RATES FOR TIME LOAD IN HP PER UNIT RATING
24. ENGINE 0.0
25. MOTORS 243. 0.07
26. 140. 0.07
27. NET LOAD 362. 0.07

28. THE COMPUTED RESISTIVE LOAD IS 24572. LB-FT-SQED = 0.63 PERCENT RATING
29. THE ACCUMULATED SYSTEM INERTIA IS 34572. LB-FT-SQED = 0.003400364

30. THE INRUSH POWER FOR THE MOTORS AT THIS STEP IS 902. KW AND THE COMPUTED INRUSH POWER IS 965. KW

31. VOLTAGE RISE AT THIS STEP DIP = 4.55
32. RECOVERY TIME TO 90.0 PERCENT = 0.031
33. TOTAL RECOVERY TIME = 0.100
34. 0.015 0.035

35. MOTOR NUMBER 1 MOTOR RATING = 140. HP AT 1000. RPM
36. THE MOTOR HAS 150. LB-FT SQUARED INERTIA AND WILL HAVE A 100. KW LOAD WHEN RUNNING.
37. FULL LOAD TORQUE IS 400. LB-FT.
38. FLAG 1 = 0. FLAG 2 = 2. FLAG 3 = 0.
39. INRUSH TIME = 0.5000, KW = 1.35.

40. INPUT TIME = 0.0 KW = 135.
41. TIME = 0.1000, INCREMENTAL KW LOAD = 172.
42. TIME = 0.2000, INCREMENTAL KW LOAD = 152.
43. TIME = 0.3000, INCREMENTAL KW LOAD = 132.
44. TIME = 0.4000, INCREMENTAL KW LOAD = 112.
45. TIME = 0.5000, INCREMENTAL KW LOAD = 92.

FREQUENCY AND VOLTAGE CYCLES, 100 FREQUENCIES TESTED
ATKINS P-1, S/D 20:25, 42 OP, 2850 KU @ 900 RPM, 100% LOAD, UNIT 2

TIME = 0.6000	INCREMENTAL KW 1.060	1.41
TIME = 0.7000	INCREMENTAL KW 1.050	1.41
TIME = 0.8000	INCREMENTAL KW 1.050	1.41
TIME = 0.9000	INCREMENTAL KW 1.050	1.41
TIME = 1.0000	INCREMENTAL KW 1.050	1.41
INPUT - TIME = 1.0000, KW = 154.	LINE = 1.5000, KW = 154.	
INPUT - TIME = 1.7000, KW = 232.	TIME = 1.1000, INCREMENTAL KW 1.060	1.51
INPUT - TIME = 1.8660, KW = 290.	TIME = 1.2000, INCREMENTAL KW 1.050	1.51
INPUT - TIME = 1.9000, KW = 290.	TIME = 1.3000, INCREMENTAL KW 1.050	1.51
INPUT - TIME = 1.9000, KW = 290.	TIME = 1.4000, INCREMENTAL KW 1.050	1.51
INPUT - TIME = 1.9000, KW = 290.	TIME = 1.5000, INCREMENTAL KW 1.050	1.51
PEAK LOAD = 290. AT 1.9000 ACCORDING WITH PEAK VOLATAGE AT 2.1600	LINE = 2.0000, INCREMENTAL KW LOAD = 1.5.	
PEAK LOAD KW = 290. AND OCCURS AT 2.16 WITH RECOVERY AT 2.39		
TIME INCREMENTAL LOAD-KW CHANGE IN DEVIATION NET DEVIATION NET LOAD-KW AVAILABLE LOAD-KW		
0.10 305.10 0.13024 0.13024 305.10 0.0 0.		
0.20 385.25 0.13029 0.26197 305.25 0.0 0.		
0.30 305.25 0.13059 0.32291 305.25 0.0 0.		
0.40 305.25 0.13099 0.35230 305.25 0.0 0.		
0.50 305.25 0.03129 0.34253 365.25 533.92 1.		
0.60 397.57 -0.05437 0.40763 367.57 509.72 1.		
0.70 389.37 -0.05974 0.43737 369.37 502.17 1.		
0.80 392.22 -0.06448 0.36237 369.22 500.78 1.		
0.90 354.54 -0.06798 0.29361 374.54 578.31 1.		
1.00 396.86 -0.07412 0.21947 366.86 614.97 1.		
1.10 373.22 -0.07790 0.13750 373.22 630.31 1.		
1.20 310.78 -0.08581 0.05377 310.78 653.15 1.		
DEVIATION AT INFLECTION = 0.573	SYSTEM PLOAD TIME = 0.439	
MAXIMUM DEVIATION = 0.573	0.573	
AMOUNT OF RECOVERY TO 75.0 PERCENT = 0.9	0.3359	
TOTAL RECOVERY TIME = 1.259	1.259	

FREQUENCY AND VOLATILE EXCITATION PREDICTIONS PROGRAM PAGE 3

Ques. 2 THE SIGHTING TIME IS 4.50 SECONDS
GAPS ARE AS FOLLOWS:

THE ACCUMULATED RESISTIVE LOAD IS 34722 KW, $L_B - FT - SORD = \frac{C_{DF}}{C_{SF}} = 0.0001853247$

卷之三

MOTOR IN HUB, A MOTOR FAILING = 300. HP AT 895 RPM.
TWO LOADS HAD BEEN TESTED, ONE SQUARED TIRELLA AND ONE HOLLOW.
LOAD TESTED = 633.4748 LB-F-T
LOAD KNUSED = 633.61 LB-F-T
TESTED EFFICIENCY OF 20 PERCENT.

THE JOURNAL OF CLIMATE

INPUTS- PERCENT		AVERAGE		OUTPUT-		PERCENT		ACCURACY		LINEARITY	
SPEED	MOTOR	LOAD	MOTOR	LOAD	TIME	AV. TERM	MOTOR	BET.	SPEED	PERCENT	PERCENT
INCHMENT	INCHQUE	TORQUE	TORQUE	TORQUE	SECONDS	VOLUME	QUEUE	QUEUE	CHANNEL	STEEL	TIME
0.5	100	0.5	100	0.5	0.5	100	100	100	100	100	0.5
1.0	100	1.0	100	1.0	1.0	100	100	100	100	100	1.0
1.5	100	1.5	100	1.5	1.5	100	100	100	100	100	1.5
2.0	100	2.0	100	2.0	2.0	100	100	100	100	100	2.0
2.5	100	2.5	100	2.5	2.5	100	100	100	100	100	2.5
3.0	100	3.0	100	3.0	3.0	100	100	100	100	100	3.0
3.5	100	3.5	100	3.5	3.5	100	100	100	100	100	3.5
4.0	100	4.0	100	4.0	4.0	100	100	100	100	100	4.0
4.5	100	4.5	100	4.5	4.5	100	100	100	100	100	4.5
5.0	100	5.0	100	5.0	5.0	100	100	100	100	100	5.0
5.5	100	5.5	100	5.5	5.5	100	100	100	100	100	5.5
6.0	100	6.0	100	6.0	6.0	100	100	100	100	100	6.0
6.5	100	6.5	100	6.5	6.5	100	100	100	100	100	6.5
7.0	100	7.0	100	7.0	7.0	100	100	100	100	100	7.0
7.5	100	7.5	100	7.5	7.5	100	100	100	100	100	7.5
8.0	100	8.0	100	8.0	8.0	100	100	100	100	100	8.0
8.5	100	8.5	100	8.5	8.5	100	100	100	100	100	8.5
9.0	100	9.0	100	9.0	9.0	100	100	100	100	100	9.0
9.5	100	9.5	100	9.5	9.5	100	100	100	100	100	9.5
10.0	100	10.0	100	10.0	10.0	100	100	100	100	100	10.0

PERIODIC REPORT FOR THE PROJECT PART 3
MARCH 2005 - APRIL 2006

WAVEFORMS, FREQUENCY AND VOLTAGE, CALCULATION PREDICTION PROGRAM, PAGE 1
STEP NO. 3 THE STARTING TIME IS 10.00 SECONDS

THE LOADS ARE AS FOLLOWS:
LOAD KW PER UNIT RATING

TEST NO.	LOAD KW	PERCENT
1	497.00	100.00
2	1431.00	51.00

TIME ACCUMULATED RESISTIVE LOAD IS 15 39722 KW LB-FR-SQED = C2P = 0.0029592176

THE BRAKING POWER FOR THE MOTORS AT THIS STEP IS 3534.3 KW APP. H.P. COEFFICIENT MATCH POWER IS .3934.3 KW

VOLTAGE DIP = 16.010

TIME OF MAXIMUM VOLTAGE DIP = 0.100

RECOVERY TIME TO 90.0 PERCENT = 0.207

TOTAL RECOVERY TIME = 0.363

0.949 = 0.413

MOTOR NUMBER 1 MOTOR RATING = 600 KW AT 3575 RPM.
THE ENGINE HAS BEEN SQUARED. MECHA AND WILL HAVE A 300 KW LOAD WHEN RUNNING.
TOTAL LOAD KW IS 497.801. LB-FR-SQED = 0.0029592176

FLAG 1 = 0. FLAG 2 = 0. ASSUMED EFFICIENCY OF 90 PERCENT.

TEST NO. PERCENT AVERAGE OUTPUT

SPEED	MOTOR	LOAD	MOTOR	LOAD	TIME	AV. TACH	MOTOR	NET TORQUE	PERCENT	SPEED	PERCENT	KW LOAD	ACCU. LOAD	LICKWILL	ACCU. LICKWILL
0.0	0.0	0.00	15.00	12.00	0.0	0.10	22.00	15.00	97.00	0.00	0.00	0.00	0.00	375.00	375.00
5.00	5.00	9.00	79.50	42.00	0.20	0.78	36.78	35.00	91.00	1.00	3.00	3.00	3.00	650.00	650.00
10.00	7.50	5.00	72.00	7.00	0.30	0.39	92.74	61.96	54.96	2.40	6.20	6.20	6.20	650.00	650.00
15.00	10.00	4.00	65.50	4.50	0.40	0.56	100.00	73.50	67.00	3.00	12.00	12.00	12.00	262.00	262.00
20.00	12.50	3.00	55.00	4.00	0.50	0.60	100.00	75.00	71.00	3.10	15.40	15.40	15.40	674.00	674.00
25.00	15.00	2.00	47.00	5.00	0.60	0.60	100.00	75.00	71.00	3.10	18.40	18.40	18.40	873.00	873.00
30.00	17.50	1.00	39.50	7.00	0.70	0.60	100.00	77.00	75.00	3.15	21.57	21.57	21.57	676.00	676.00
35.00	20.00	10.00	82.50	9.00	1.00	0.60	100.00	77.00	72.50	3.17	27.59	27.59	27.59	676.00	676.00
40.00	22.50	14.00	65.00	12.00	1.40	0.60	100.00	80.00	72.50	3.21	30.73	30.73	30.73	676.00	676.00
45.00	25.00	17.00	58.50	15.50	1.30	0.60	100.00	80.00	74.00	3.24	37.37	37.37	37.37	676.00	676.00
50.00	27.50	22.00	50.50	19.50	1.50	0.60	100.00	80.00	75.00	3.26	43.53	43.53	43.53	676.00	676.00
55.00	30.00	26.00	44.50	24.00	1.60	0.60	100.00	80.00	80.00	3.28	47.41	47.41	47.41	676.00	676.00
60.00	34.00	34.00	43.00	20.50	1.70	0.60	100.00	84.56	90.50	3.26	51.36	51.36	51.36	751.00	751.00
65.00	38.00	37.00	46.50	30.00	1.80	0.60	100.00	82.00	102.50	3.22	55.20	55.20	55.20	821.00	821.00
70.00	42.00	43.00	46.00	40.00	1.90	0.60	100.00	82.00	114.50	3.01	60.00	60.00	60.00	873.00	873.00

TABLE B1. FREQUENCY AND VOLTAGE EXCURSION PREDICTION DURING PAGE APPARATUS F & L, 3/0 20525, 12 OF, 2350 KW 6.559 KW, 1000 16653, UNIT 2

75.00	172.00	50.00	169.00	46.50	2.00	100.00	161.00	424.00	5.27	25.13	5.27.
75.20	175.00	57.00	173.50	53.50	2.10	100.00	162.50	427.50	5.36	21.53	5.37.
75.30	177.60	64.00	173.00	60.50	2.00	100.00	163.00	430.00	5.45	18.73	5.47.
75.40	178.00	72.00	170.50	63.00	2.00	100.00	163.00	433.50	5.55	16.73	5.57.
75.50	157.00	00.00	162.50	76.00	2.40	100.00	170.50	162.50	4.48	86.31	3.95.
75.60	155.85	00.00	162.50	76.00	2.50	100.00	162.50	162.50	3.78	90.01	3.45.
75.70	155.85	00.00	162.50	76.00	2.60	100.00	162.50	162.50	3.78	92.71	3.15.
75.80	155.85	00.00	162.50	76.00	2.70	100.00	162.50	162.50	3.78	95.41	2.85.
75.90	155.85	00.00	162.50	76.00	2.80	100.00	162.50	162.50	3.78	97.11	2.55.
76.00	155.85	00.00	162.50	76.00	2.90	100.00	162.50	162.50	3.78	97.81	2.25.
76.10	155.85	00.00	162.50	76.00	3.00	100.00	162.50	162.50	3.78	98.51	2.00.
76.20	155.85	00.00	162.50	76.00	3.10	100.00	162.50	162.50	3.78	99.21	1.75.
76.30	155.85	00.00	162.50	76.00	3.20	100.00	162.50	162.50	3.78	99.91	1.50.
76.40	155.85	00.00	162.50	76.00	3.30	100.00	162.50	162.50	3.78	100.61	1.25.
76.50	155.85	00.00	162.50	76.00	3.40	100.00	162.50	162.50	3.78	101.31	1.00.
76.60	155.85	00.00	162.50	76.00	3.50	100.00	162.50	162.50	3.78	102.01	0.75.
76.70	155.85	00.00	162.50	76.00	3.60	100.00	162.50	162.50	3.78	102.71	0.50.
76.80	155.85	00.00	162.50	76.00	3.70	100.00	162.50	162.50	3.78	103.41	0.25.
76.90	155.85	00.00	162.50	76.00	3.80	100.00	162.50	162.50	3.78	104.11	0.00.
77.00	155.85	00.00	162.50	76.00	3.90	100.00	162.50	162.50	3.78	104.81	-0.25.
77.10	155.85	00.00	162.50	76.00	4.00	100.00	162.50	162.50	3.78	105.51	-0.50.
77.20	155.85	00.00	162.50	76.00	4.10	100.00	162.50	162.50	3.78	106.21	-0.75.
77.30	155.85	00.00	162.50	76.00	4.20	100.00	162.50	162.50	3.78	106.91	-1.00.
77.40	155.85	00.00	162.50	76.00	4.30	100.00	162.50	162.50	3.78	107.61	-1.25.
77.50	155.85	00.00	162.50	76.00	4.40	100.00	162.50	162.50	3.78	108.31	-1.50.
77.60	155.85	00.00	162.50	76.00	4.50	100.00	162.50	162.50	3.78	109.01	-1.75.
77.70	155.85	00.00	162.50	76.00	4.60	100.00	162.50	162.50	3.78	109.71	-2.00.
77.80	155.85	00.00	162.50	76.00	4.70	100.00	162.50	162.50	3.78	110.41	-2.25.
77.90	155.85	00.00	162.50	76.00	4.80	100.00	162.50	162.50	3.78	111.11	-2.50.
78.00	155.85	00.00	162.50	76.00	4.90	100.00	162.50	162.50	3.78	111.81	-2.75.
78.10	155.85	00.00	162.50	76.00	5.00	100.00	162.50	162.50	3.78	112.51	-3.00.
78.20	155.85	00.00	162.50	76.00	5.10	100.00	162.50	162.50	3.78	113.21	-3.25.
78.30	155.85	00.00	162.50	76.00	5.20	100.00	162.50	162.50	3.78	113.91	-3.50.
78.40	155.85	00.00	162.50	76.00	5.30	100.00	162.50	162.50	3.78	114.61	-3.75.
78.50	155.85	00.00	162.50	76.00	5.40	100.00	162.50	162.50	3.78	115.31	-4.00.
78.60	155.85	00.00	162.50	76.00	5.50	100.00	162.50	162.50	3.78	116.01	-4.25.
78.70	155.85	00.00	162.50	76.00	5.60	100.00	162.50	162.50	3.78	116.71	-4.50.
78.80	155.85	00.00	162.50	76.00	5.70	100.00	162.50	162.50	3.78	117.41	-4.75.
78.90	155.85	00.00	162.50	76.00	5.80	100.00	162.50	162.50	3.78	118.11	-5.00.
79.00	155.85	00.00	162.50	76.00	5.90	100.00	162.50	162.50	3.78	118.81	-5.25.
79.10	155.85	00.00	162.50	76.00	6.00	100.00	162.50	162.50	3.78	119.51	-5.50.
79.20	155.85	00.00	162.50	76.00	6.10	100.00	162.50	162.50	3.78	120.21	-5.75.
79.30	155.85	00.00	162.50	76.00	6.20	100.00	162.50	162.50	3.78	120.91	-6.00.
79.40	155.85	00.00	162.50	76.00	6.30	100.00	162.50	162.50	3.78	121.61	-6.25.
79.50	155.85	00.00	162.50	76.00	6.40	100.00	162.50	162.50	3.78	122.31	-6.50.
79.60	155.85	00.00	162.50	76.00	6.50	100.00	162.50	162.50	3.78	123.01	-6.75.
79.70	155.85	00.00	162.50	76.00	6.60	100.00	162.50	162.50	3.78	123.71	-7.00.
79.80	155.85	00.00	162.50	76.00	6.70	100.00	162.50	162.50	3.78	124.41	-7.25.
79.90	155.85	00.00	162.50	76.00	6.80	100.00	162.50	162.50	3.78	125.11	-7.50.
80.00	155.85	00.00	162.50	76.00	6.90	100.00	162.50	162.50	3.78	125.81	-7.75.
80.10	155.85	00.00	162.50	76.00	7.00	100.00	162.50	162.50	3.78	126.51	-8.00.
80.20	155.85	00.00	162.50	76.00	7.10	100.00	162.50	162.50	3.78	127.21	-8.25.
80.30	155.85	00.00	162.50	76.00	7.20	100.00	162.50	162.50	3.78	127.91	-8.50.
80.40	155.85	00.00	162.50	76.00	7.30	100.00	162.50	162.50	3.78	128.61	-8.75.
80.50	155.85	00.00	162.50	76.00	7.40	100.00	162.50	162.50	3.78	129.31	-9.00.
80.60	155.85	00.00	162.50	76.00	7.50	100.00	162.50	162.50	3.78	130.01	-9.25.
80.70	155.85	00.00	162.50	76.00	7.60	100.00	162.50	162.50	3.78	130.71	-9.50.
80.80	155.85	00.00	162.50	76.00	7.70	100.00	162.50	162.50	3.78	131.41	-9.75.
80.90	155.85	00.00	162.50	76.00	7.80	100.00	162.50	162.50	3.78	132.11	-10.00.
81.00	155.85	00.00	162.50	76.00	7.90	100.00	162.50	162.50	3.78	132.81	-10.25.
81.10	155.85	00.00	162.50	76.00	8.00	100.00	162.50	162.50	3.78	133.51	-10.50.
81.20	155.85	00.00	162.50	76.00	8.10	100.00	162.50	162.50	3.78	134.21	-10.75.
81.30	155.85	00.00	162.50	76.00	8.20	100.00	162.50	162.50	3.78	134.91	-11.00.
81.40	155.85	00.00	162.50	76.00	8.30	100.00	162.50	162.50	3.78	135.61	-11.25.
81.50	155.85	00.00	162.50	76.00	8.40	100.00	162.50	162.50	3.78	136.31	-11.50.
81.60	155.85	00.00	162.50	76.00	8.50	100.00	162.50	162.50	3.78	137.01	-11.75.
81.70	155.85	00.00	162.50	76.00	8.60	100.00	162.50	162.50	3.78	137.71	-12.00.
81.80	155.85	00.00	162.50	76.00	8.70	100.00	162.50	162.50	3.78	138.41	-12.25.
81.90	155.85	00.00	162.50	76.00	8.80	100.00	162.50	162.50	3.78	139.11	-12.50.
82.00	155.85	00.00	162.50	76.00	8.90	100.00	162.50	162.50	3.78	139.81	-12.75.
82.10	155.85	00.00	162.50	76.00	9.00	100.00	162.50	162.50	3.78	140.51	-13.00.
82.20	155.85	00.00	162.50	76.00	9.10	100.00	162.50	162.50	3.78	141.21	-13.25.
82.30	155.85	00.00	162.50	76.00	9.20	100.00	162.50	162.50	3.78	141.91	-13.50.
82.40	155.85	00.00	162.50	76.00	9.30	100.00	162.50	162.50	3.78	142.61	-13.75.
82.50	155.85	00.00	162.50	76.00	9.40	100.00	162.50	162.50	3.78	143.31	-14.00.
82.60	155.85	00.00	162.50	76.00	9.50	100.00	162.50	162.50	3.78	144.01	-14.25.
82.70	155.85	00.00	162.50	76.00	9.60	100.00	162.50	162.50	3.78	144.71	-14.50.
82.80	155.85	00.00	162.50	76.00	9.70	100.00	162.50	162.50	3.78	145.41	-14.75.
82.90	155.85	00.00	162.50	76.00	9.80	100.00	162.50	162.50	3.78	146.11	-15.00.
83.00	155.85	00.00	162.50	76.00	9.90	100.00	162.50	162.50	3.78	146.81	-15.25.
83.10	155.85	00.00	162.50	76.00	10.00	100.00	162.50	162.50	3.78	147.51	-15.50.
83.20	155.85	00.00	162.50	76.00	10.10	100.00	162.50	162.50	3.78	148.21	-15.75.
83.30	155.85	00.00	162.50	76.00	10.20	100.00	162.50	162.50	3.78	148.91	-16.00.
83.40	155.85	00.00	162.50	76.00	10.30	100.00	162.50	162.50	3.78	149.61	-16.25.
83.50	155.85	00.00	162.50	76.00	10.40	100.00	162.50				

12-220010 MELBOURNE AND VILLAGE EJECTOR SHIP FEEDING FOUNTAIN

THE THROTTLE POWER FOR THE MOTORS AT THIS STEP IS 2954. KW AND THE CORRECTED THROTTLE POWER IS 2954. 5KVA									
MOTOR LINE VOLTS	THROTTLE VOLTS	PERCENT	13.733	0.303	0.303	0.303	0.303	0.303	0.303
INCREMENT	THROTTLE VOLTS	PERCENT	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.0	100.00	100.00	15.90	101.00	12.00	0.0	0.0	0.0	0.0
5.00	102.00	102.00	9.00	102.50	7.50	0.40	93.22	36.03	91.50
10.00	103.00	103.00	6.00	103.50	5.00	0.20	99.73	23.71	73.34
15.00	104.00	104.00	4.00	103.50	4.00	0.00	99.73	23.71	73.34
20.00	106.00	106.00	4.00	103.50	4.00	0.30	96.30	100.62	96.12
30.00	113.00	113.00	8.00	111.50	6.50	0.00	99.79	111.04	104.54
35.00	117.00	117.00	10.00	115.00	9.00	0.00	99.79	111.04	104.54
35.00	121.00	121.00	13.00	112.00	11.50	0.00	100.65	110.56	107.59
35.00	125.00	125.00	17.00	123.20	15.00	0.00	100.65	110.56	107.59
35.00	132.00	132.00	22.00	126.20	12.50	0.00	100.65	110.56	107.59
35.00	142.00	142.00	26.00	137.00	24.00	0.00	100.65	110.56	107.59
35.00	164.00	164.00	31.00	153.00	28.50	0.70	100.65	110.56	107.59
35.00	187.00	187.00	37.00	157.50	34.00	0.70	100.65	110.56	107.59
35.00	203.00	203.00	42.00	162.50	39.50	0.70	100.65	110.56	107.59
35.00	218.00	218.00	47.00	165.50	45.50	0.70	100.65	110.56	107.59
35.00	230.00	230.00	53.00	169.00	51.50	0.70	100.65	110.56	107.59
35.00	245.00	245.00	63.00	183.00	59.50	0.90	100.65	110.56	107.59
35.00	262.00	262.00	72.00	192.50	67.00	0.90	100.65	110.56	107.59
35.00	282.00	282.00	79.00	193.50	75.00	1.00	100.65	110.56	107.59
35.00	300.00	300.00	87.00	171.50	83.00	1.00	100.65	110.56	107.59
35.00	316.00	316.00	97.00	171.50	83.00	1.00	100.65	110.56	107.59
35.00	331.00	331.00	107.00	171.50	83.00	1.00	100.65	110.56	107.59
35.00	346.00	346.00	117.00	171.50	83.00	1.00	100.65	110.56	107.59
35.00	361.00	361.00	127.00	171.50	83.00	1.00	100.65	110.56	107.59
35.00	376.00	376.00	137.00	171.50	83.00	1.00	100.65	110.56	107.59
35.00	391.00	391.00	147.00	171.50	83.00	1.00	100.65	110.56	107.59
35.00	406.00	406.00	157.00	171.50	83.00	1.00	100.65	110.56	107.59
35.00	421.00	421.00	167.00	171.50	83.00	1.00	100.65	110.56	107.59
35.00	436.00	436.00	177.00	171.50	83.00	1.00	100.65	110.56	107.59
35.00	451.00	451.00	187.00	171.50	83.00	1.00	100.65	110.56	107.59
35.00	466.00	466.00	197.00	171.50	83.00	1.00	100.65	110.56	107.59
35.00	481.00	481.00	207.00	171.50	83.00	1.00	100.65	110.56	107.59
35.00	496.00	496.00	217.00	171.50	83.00	1.00	100.65	110.56	107.59
35.00	511.00	511.00	227.00	171.50	83.00	1.00	100.65	110.56	107.59
35.00	526.00	526.00	237.00	171.50	83.00	1.00	100.65	110.56	107.59
35.00	541.00	541.00	247.00	171.50	83.00	1.00	100.65	110.56	107.59
35.00	556.00	556.00	257.00	171.50	83.00	1.00	100.65	110.56	107.59
35.00	571.00	571.00	267.00	171.50	83.00	1.00	100.65	110.56	107.59
35.00	586.00	586.00	277.00	171.50	83.00	1.00	100.65	110.56	107.59
35.00	601.00	601.00	287.00	171.50	83.00	1.00	100.65	110.56	107.59
35.00	616.00	616.00	297.00	171.50	83.00	1.00	100.65	110.56	107.59
35.00	631.00	631.00	307.00	171.50	83.00	1.00	100.65	110.56	107.59
35.00	646.00	646.00	317.00	171.50	83.00	1.00	100.65	110.56	107.59
35.00	661.00	661.00	327.00	171.50	83.00	1.00	100.65	110.56	107.59
35.00	676.00	676.00	337.00	171.50	83.00	1.00	100.65	110.56	107.59
35.00	691.00	691.00	347.00	171.50	83.00	1.00	100.65	110.56	107.59
35.00	706.00	706.00	357.00	171.50	83.00	1.00	100.65	110.56	107.59
35.00	721.00	721.00	367.00	171.50	83.00	1.00	100.65	110.56	107.59
35.00	736.00	736.00	377.00	171.50	83.00	1.00	100.65	110.56	107.59
35.00	751.00	751.00	387.00	171.50	83.00	1.00	100.65	110.56	107.59
35.00	766.00	766.00	397.00	171.50	83.00	1.00	100.65	110.56	107.59
35.00	781.00	781.00	407.00	171.50	83.00	1.00	100.65	110.56	107.59
35.00	796.00	796.00	417.00	171.50	83.00	1.00	100.65	110.56	107.59
35.00	811.00	811.00	427.00	171.50	83.00	1.00	100.65	110.56	107.59
35.00	826.00	826.00	437.00	171.50	83.00	1.00	100.65	110.56	107.59
35.00	841.00	841.00	447.00	171.50	83.00	1.00	100.65	110.56	107.59
35.00	856.00	856.00	457.00	171.50	83.00	1.00	100.65	110.56	107.59
35.00	871.00	871.00	467.00	171.50	83.00	1.00	100.65	110.56	107.59
35.00	886.00	886.00	477.00	171.50	83.00	1.00	100.65	110.56	107.59
35.00	901.00	901.00	487.00	171.50	83.00	1.00	100.65	110.56	107.59
35.00	916.00	916.00	497.00	171.50	83.00	1.00	100.65	110.56	107.59
35.00	931.00	931.00	507.00	171.50	83.00	1.00	100.65	110.56	107.59
35.00	946.00	946.00	517.00	171.50	83.00	1.00	100.65	110.56	107.59
35.00	961.00	961.00	527.00	171.50	83.00	1.00	100.65	110.56	107.59
35.00	976.00	976.00	537.00	171.50	83.00	1.00	100.65	110.56	107.59
35.00	991.00	991.00	547.00	171.50	83.00	1.00	100.65	110.56	107.59
35.00	1006.00	1006.00	557.00	171.50	83.00	1.00	100.65	110.56	107.59
35.00	1021.00	1021.00	567.00	171.50	83.00	1.00	100.65	110.56	107.59
35.00	1036.00	1036.00	577.00	171.50	83.00	1.00	100.65	110.56	107.59
35.00	1051.00	1051.00	587.00	171.50	83.00	1.00	100.65	110.56	107.59
35.00	1066.00	1066.00	597.00	171.50	83.00	1.00	100.65	110.56	107.59
35.00	1081.00	1081.00	607.00	171.50	83.00	1.00	100.65	110.56	107.59
35.00	1096.00	1096.00	617.00	171.50	83.00	1.00	100.65	110.56	107.59
35.00	1111.00	1111.00	627.00	171.50	83.00	1.00	100.65	110.56	107.59
35.00	1126.00	1126.00	637.00	171.50	83.00	1.00	100.65	110.56	107.59
35.00	1141.00	1141.00	647.00	171.50	83.00	1.00	100.65	110.56	107.59
35.00	1156.00	1156.00	657.00	171.50	83.00	1.00	100.65	110.56	107.59
35.00	1171.00	1171.00	667.00	171.50	83.00	1.00	100.65	110.56	107.59
35.00	1186.00	1186.00	677.00	171.50	83.00	1.00	100.65	110.56	107.59
35.00	1201.00	1201.00	687.00	171.50	83.00	1.00	100.65	110.56	107.59
35.00	1216.00	1216.00	697.00	171.50	83.00	1.00	100.65	110.56	107.59
35.00	1231.00	1231.00	707.00	171.50	83.00	1.00	100.65	110.56	107.59
35.00	1246.00	1246.00	717.00	171.50	83.00	1.00	100.65	110.56	107.59
35.00	1261.00	1261.00	727.00	171.50	83.00	1.00	100.65	110.56	107.59
35.00	1276.00	1276.00	737.00	171.50	83.00	1.00	100.65	110.56	107.59
35.00	1291.00	1291.00	747.00	171.50	83.00	1.00	100.65	110.56	107.59
35.00	1306.00	1306.00	757.00	171.50	83.00	1.00	100.65	110.56	107.59
35.00	1321.00	1321.00	767.00	171.50	83.00	1.00	100.65	110.56	107.59
35.00	1336.00	1336.00	777.00	171.50	83.00	1.00	100.65	110.56	107.59
35.00	1351.00	1351.00	787.00	171.50	83.00	1.00	100.65	110.56	107.59
35.00	1366.00	1366.00	797.00	171.50	83.00	1.00	100.65	110.56	107.59
35.00	1381.00	1381.00	807.00	171.50	83.00	1.00	100.65	110.56	107.59
35.00	1396.00	1396.00	817.00	171.50	83.00	1.00	100.65	110.56	107.59
35.00	1411.00	1411.00	827.00	171.50	83.00	1.00	100.65	110.56	107.59
35.00	1426.00	1426.00	837.00	171.50	83.00	1.00	100.65	110.56	107.59
35.00	1441.00	1441.00	847.00	171.50	83.00	1.00	100.65	110.56	107.59
35.00	1456.00	1456.00	857.00	171.50	83.00	1.00	100.65	110.56	107.59
35.00	1471.00	1471.00	867.00	171.50	83.00	1.00	100.65	110.56	107.59
35.00	1486.00	1486.00	877.00	171.50	83.00	1.00	100.65	110.56	107.59
35.00	1501.00	1501.00	887.00	171.50	83.00	1.00	100.65	110.56	107.59
35.00	1516.00	1516.00	897.00	171.50	83.00	1.00	100.65	110.56	107.59
35.00	1531.00	1531.00	907.00	171.50	83.00	1.00	100.65	110.56	107.59
35.00	1546.00	1546.00	917.00	171.50	83.00	1.00	100.65	110.56	107

REF ID: A9520640 FREQUENCY AND VOLTAGE PREDICTION PROGRAM FOR ARPHAS F&L, S/N 205525, 12/01/2000 2350 KM 8 360 FT. 100A LOAD, WITH 2

DEVIATION AT TIME EJECTION =	0.476
SECOND DEAN TIME =	0.417
MAXIMUM DEVIATION =	0.776
LIMIT OF ACCURACY EVALUATION =	0.417
TIME OF RECOVERY TO 98.0 PERCENT =	0.622
TIME OF RECOVERY TO 99.0 PERCENT =	0.622

TIME RECOVERY TIME = $\frac{1}{\lambda}$

THE SILENT LANGUAGE OF THE EARTH

THE LOADS AS FOLLOWS IF THE EXISTING UNIT RATING IS 57.63

150. 150. 150. 150.

THE INTEGRATED SYSTEM THAT IS 30365.FM
THE ACTIVATED SYSTEM THAT IS 30365.CB

THE USE OF THE FIELD IN THE STUDY OF THE ENVIRONMENT

TOTAL RECOGNITION RATE = 0.935
TOTAL PRESENCE RATE = 0.910

the same R. & M. R. R. rating as the 50' long 343-ft. long bridge at Lemoore.

FLAG₁ = 0, FLAG₂ = 0, FLAG₃ = 0.

100.0% PERCENT
COSTS

SPD	MOTOR	LOAD	WOTR	LO
DISPLACEMENT	VELOC.	VELOC.	VELOC.	VELOC.

18-00 **231.00** **0.10** **226.50**
18-00 **230.00** **0.24** **226.52**

1500-0 FREQUENCY AND WAVELENGTH CORRECTION PROJECT REPORT
GERMANIA F. L., S.Q.205525, 42 OF, 2850 KM & COORD, 1000 LONG, 1911 F 2

ADDITIONAL EFFICIENCY AND VOLTAGE REGULATION TESTS THROUGH LOAD 1600, LOAD 1600, INPUT 2

MOTOR NUMBER 4 MOTOR RATING = 365 HP AT 1775 RPM
THE MOTOR HAS 85 LEAD STEPPED INERTIA AND WILL HAVE A 65% KU LOAD WHEN FURNISHING,
SINGLE LOAD TORQUE IS 341 LB-FEET
LOAD KW IS 376, AND AN EQUIPPED EFFICIENCY OF 90 PERCENT.

INPUTS- PERCENT	AVAILABILITY	OUTPUT	PERCENT CORRECTED	PERCENT	INCREMENT	ACROSS, INCHES
STAND. MOTOR LOAD	NOISE	LOAD	LINE	LINE	SEED	KU LOAD
INPUT	TORQUE	TORQUE	VOLTAGE	SECONDS	CHARGE	SPEED
0.00	255.00	0.0	250.00	0.01	0.0	0.0
5.00	242.00	0.01	254.50	0.06	0.0	0.0
10.00	242.00	0.10	254.50	0.22	0.19	0.03
15.00	242.00	0.24	254.50	0.77	224.20	14.03
20.00	242.00	0.49	254.50	1.18	224.20	14.03
25.00	242.00	0.79	254.50	2.13	224.20	14.03
30.00	242.00	1.25	253.00	0.70	222.00	12.11
35.00	242.00	1.79	253.00	0.30	220.00	12.11
40.00	176.00	6.49	172.50	5.34	174.15	14.05
45.00	121.00	2.41	173.50	7.76	170.50	17.49
50.00	166.00	12.59	188.50	10.81	170.50	17.49
55.00	162.00	16.61	164.00	12.57	170.50	17.49
60.00	151.00	31.50	181.50	12.12	170.50	17.49
65.00	161.00	27.46	161.00	24.53	161.00	16.93
70.00	164.00	34.39	162.50	30.08	161.00	16.93
75.00	160.00	42.11	163.00	30.28	160.50	16.93
80.00	177.00	51.29	175.50	48.60	160.50	16.93
85.00	193.00	61.31	182.00	55.31	160.50	16.93
90.00	213.00	72.99	203.00	67.46	160.50	16.93
95.00	173.00	85.74	203.00	79.32	160.50	16.93
100.00	213.00	109.09	203.00	72.87	160.50	16.93
105.00	213.00	109.09	203.00	1.66	160.50	16.93
110.00	213.00	109.09	203.00	1.10	160.50	16.93
115.00	213.00	109.09	203.00	0.66	160.50	16.93
120.00	213.00	109.09	203.00	0.22	160.50	16.93
125.00	213.00	109.09	203.00	0.00	160.50	16.93
130.00	213.00	109.09	203.00	-0.10	160.50	16.93
135.00	213.00	109.09	203.00	-0.24	160.50	16.93
140.00	213.00	109.09	203.00	-0.40	160.50	16.93
145.00	213.00	109.09	203.00	-0.56	160.50	16.93
150.00	213.00	109.09	203.00	-0.72	160.50	16.93
155.00	213.00	109.09	203.00	-0.88	160.50	16.93
160.00	213.00	109.09	203.00	-1.04	160.50	16.93
165.00	213.00	109.09	203.00	-1.20	160.50	16.93
170.00	213.00	109.09	203.00	-1.36	160.50	16.93
175.00	213.00	109.09	203.00	-1.52	160.50	16.93
180.00	213.00	109.09	203.00	-1.68	160.50	16.93
185.00	213.00	109.09	203.00	-1.84	160.50	16.93
190.00	213.00	109.09	203.00	-2.00	160.50	16.93
195.00	213.00	109.09	203.00	-2.16	160.50	16.93
200.00	213.00	109.09	203.00	-2.32	160.50	16.93
205.00	213.00	109.09	203.00	-2.48	160.50	16.93
210.00	213.00	109.09	203.00	-2.64	160.50	16.93
215.00	213.00	109.09	203.00	-2.80	160.50	16.93
220.00	213.00	109.09	203.00	-2.96	160.50	16.93
225.00	213.00	109.09	203.00	-3.12	160.50	16.93
230.00	213.00	109.09	203.00	-3.28	160.50	16.93
235.00	213.00	109.09	203.00	-3.44	160.50	16.93
240.00	213.00	109.09	203.00	-3.60	160.50	16.93
245.00	213.00	109.09	203.00	-3.76	160.50	16.93
250.00	213.00	109.09	203.00	-3.92	160.50	16.93
255.00	213.00	109.09	203.00	-4.08	160.50	16.93
260.00	213.00	109.09	203.00	-4.24	160.50	16.93
265.00	213.00	109.09	203.00	-4.40	160.50	16.93
270.00	213.00	109.09	203.00	-4.56	160.50	16.93
275.00	213.00	109.09	203.00	-4.72	160.50	16.93
280.00	213.00	109.09	203.00	-4.88	160.50	16.93
285.00	213.00	109.09	203.00	-5.04	160.50	16.93
290.00	213.00	109.09	203.00	-5.20	160.50	16.93
295.00	213.00	109.09	203.00	-5.36	160.50	16.93
300.00	213.00	109.09	203.00	-5.52	160.50	16.93
305.00	213.00	109.09	203.00	-5.68	160.50	16.93
310.00	213.00	109.09	203.00	-5.84	160.50	16.93
315.00	213.00	109.09	203.00	-6.00	160.50	16.93
320.00	213.00	109.09	203.00	-6.16	160.50	16.93
325.00	213.00	109.09	203.00	-6.32	160.50	16.93
330.00	213.00	109.09	203.00	-6.48	160.50	16.93
335.00	213.00	109.09	203.00	-6.64	160.50	16.93
340.00	213.00	109.09	203.00	-6.80	160.50	16.93
345.00	213.00	109.09	203.00	-6.96	160.50	16.93
350.00	213.00	109.09	203.00	-7.12	160.50	16.93
355.00	213.00	109.09	203.00	-7.28	160.50	16.93
360.00	213.00	109.09	203.00	-7.44	160.50	16.93
365.00	213.00	109.09	203.00	-7.60	160.50	16.93
370.00	213.00	109.09	203.00	-7.76	160.50	16.93
375.00	213.00	109.09	203.00	-7.92	160.50	16.93
380.00	213.00	109.09	203.00	-8.08	160.50	16.93
385.00	213.00	109.09	203.00	-8.24	160.50	16.93
390.00	213.00	109.09	203.00	-8.40	160.50	16.93
395.00	213.00	109.09	203.00	-8.56	160.50	16.93
400.00	213.00	109.09	203.00	-8.72	160.50	16.93
405.00	213.00	109.09	203.00	-8.88	160.50	16.93
410.00	213.00	109.09	203.00	-9.04	160.50	16.93
415.00	213.00	109.09	203.00	-9.20	160.50	16.93
420.00	213.00	109.09	203.00	-9.36	160.50	16.93
425.00	213.00	109.09	203.00	-9.52	160.50	16.93
430.00	213.00	109.09	203.00	-9.68	160.50	16.93
435.00	213.00	109.09	203.00	-9.84	160.50	16.93
440.00	213.00	109.09	203.00	-10.00	160.50	16.93
445.00	213.00	109.09	203.00	-10.16	160.50	16.93
450.00	213.00	109.09	203.00	-10.32	160.50	16.93
455.00	213.00	109.09	203.00	-10.48	160.50	16.93
460.00	213.00	109.09	203.00	-10.64	160.50	16.93
465.00	213.00	109.09	203.00	-10.80	160.50	16.93
470.00	213.00	109.09	203.00	-10.96	160.50	16.93
475.00	213.00	109.09	203.00	-11.12	160.50	16.93
480.00	213.00	109.09	203.00	-11.28	160.50	16.93
485.00	213.00	109.09	203.00	-11.44	160.50	16.93
490.00	213.00	109.09	203.00	-11.60	160.50	16.93
495.00	213.00	109.09	203.00	-11.76	160.50	16.93
500.00	213.00	109.09	203.00	-11.92	160.50	16.93
505.00	213.00	109.09	203.00	-12.08	160.50	16.93
510.00	213.00	109.09	203.00	-12.24	160.50	16.93
515.00	213.00	109.09	203.00	-12.40	160.50	16.93
520.00	213.00	109.09	203.00	-12.56	160.50	16.93
525.00	213.00	109.09	203.00	-12.72	160.50	16.93
530.00	213.00	109.09	203.00	-12.88	160.50	16.93
535.00	213.00	109.09	203.00	-13.04	160.50	16.93
540.00	213.00	109.09	203.00	-13.20	160.50	16.93
545.00	213.00	109.09	203.00	-13.36	160.50	16.93
550.00	213.00	109.09	203.00	-13.52	160.50	16.93
555.00	213.00	109.09	203.00	-13.68	160.50	16.93
560.00	213.00	109.09	203.00	-13.84	160.50	16.93
565.00	213.00	109.09	203.00	-14.00	160.50	16.93
570.00	213.00	109.09	203.00	-14.16	160.50	16.93
575.00	213.00	109.09	203.00	-14.32	160.50	16.93
580.00	213.00	109.09	203.00	-14.48	160.50	16.93
585.00	213.00	109.09	203.00	-14.64	160.50	16.93
590.00	213.00	109.09	203.00	-14.80	160.50	16.93
595.00	213.00	109.09	203.00	-14.96	160.50	16.93
600.00	213.00	109.09	203.00	-15.12	160.50	16.93
605.00	213.00	109.09	203.00	-15.28	160.50	16.93
610.00	213.00	109.09	203.00	-15.44	160.50	16.93
615.00	213.00	109.09	203.00	-15.60	160.50	16.93
620.00	213.00	109.09	203.00	-15.76	160.50	16.93
625.00	213.00	109.09	203.00	-15.92	160.50	16.93
630.00	213.00	109.09	203.00	-16.08	160.50	16.93
635.00	213.00	109.09	203.00	-16.24	160.50	16.93
640.00	213.00	109.09	203.00	-16.40	160.50	16.93
645.00	213.00	109.09	203.00	-16.56	160.50	16.93
650.00	213.00	109.09	203.00	-16.72	160.50	16.93
655.00	213.00	109.09	203.00	-16.88	160.50	16.93
660.00	213.00	109.09	203.00	-17.04	160.50	16.93
665.00	213.00	109.09	203.00	-17.20	160.50	16.93
670.00	213.00	109.09	2			

1. FREQUENCY AND VOLTAGE EXCURSION PREDICTIONS PROGRAM PAGE 15
ARKANSAS F & I, 5/0 205925, 12 GF, 2050 KW @ 906 RPM, LOAD 100%, UNIT 2

APPENDIX B1

DEVIATION AT INFLECTION =	0.330
STATION DEAD TIME =	0.576
STATION DEVIATION	0.330
PERCENT RECOVERY =	0.76
PERCENT OF RECOVERY TO 93.0 PERCENT =	0.6%
TOTAL RECOVERY TIME =	0.696

THE NO. 3 THE STARTING TIME IS 69.69 SECONDS
FOR A LOAD OF 100% OF RATED
LOAD KW IN FT. UNIT FATING

EXISTING LOAD:	77.54
MOTORS:	9.0
NET LOAD:	22.71
	105.
	3.05
	20.60

THE ACCUMULATED RESISTIVE LOAD IS 246 KW, LB-FT-SQRD = 6,000,000 BTU'S
THE ACCUMULATED SYSTEM INERTIA IS 40982 LB-FT-SQRD = C _{SP} = 6,000,000 BTU'S

THE THRUST POWER FOR THE MOTORS AT THIS STEP IS 536. KW

VOLTAGE DIP = 2.61%
VOLTAGE OF MAXIMUM VOLTAGE DIP = 6.61%
RECOVERY TIME TO 90.0 PERCENT = 0.017
TOTAL RECOVERY TIME = 0.029

MOTOR NUMBER 4 MOTOR RATING = 405. KW AT 1775 RPM
THE MOTOR HAS A 100% TORQUE. IT IS SET TO 100% STATED.
LOAD 1 = 0.0, FLAG 2 = 0, FLAG 3 = 1.

INPUTS- PERCENT

AVERAGE

OUTPUT

PERCENT

DECREASED

FEELING

INCREASING

ACTUAL

THICKNESS

MM

FREQUENCY AND VOLTAGE EXCITATION PREDICTION PROGRAM FOR THE MEASURES OF 2650, 4210P, 2350 KVA 500 KV, LOCAL BACKUP UNIT 2

MOTOR NUMBER 4 MOTOR RATING = 100. HP AT 1800 RPM.
THE MOTOR HAS 50- LB-FT SQUARED INERTIA AND WILL HAVE A G-1. FW LOAD WHEN RUNNING.
THE LOAD TORQUE IS 292- LB-FT
AT 1800 RPM.
THE FULL LOAD KW IS 83.
A 1% ALLOWED EFFICIENCY OF 20% PERCENT.

TIME	INCREMENTAL LOAD-KW	CHARGE IN DEVIATION	NET DEVIATION	NET LOAD-KW	AVAILABLE LOAD-KW
0.00	34.00	0.0000	0.0000	34.00	34.00
0.05	36.00	0.01052	0.01052	35.99	35.99
0.10	37.00	0.02105	0.02105	35.98	35.98
0.15	37.50	0.03157	0.03157	35.97	35.97
0.20	37.80	0.04209	0.04209	35.96	35.96
0.25	38.00	0.05261	0.05261	35.95	35.95
0.30	38.10	0.06313	0.06313	35.94	35.94
0.35	38.15	0.07365	0.07365	35.93	35.93
0.40	38.18	0.08417	0.08417	35.92	35.92
0.45	38.20	0.09469	0.09469	35.91	35.91
0.50	38.20	0.10521	0.10521	35.90	35.90
0.55	38.20	0.11573	0.11573	35.89	35.89
0.60	38.20	0.12625	0.12625	35.88	35.88
0.65	38.20	0.13677	0.13677	35.87	35.87
0.70	38.20	0.14729	0.14729	35.86	35.86
0.75	38.20	0.15781	0.15781	35.85	35.85
0.80	38.20	0.16833	0.16833	35.84	35.84
0.85	38.20	0.17885	0.17885	35.83	35.83
0.90	38.20	0.18937	0.18937	35.82	35.82
0.95	38.20	0.20000	0.20000	35.81	35.81
1.00	38.20	0.21052	0.21052	35.80	35.80
1.05	38.20	0.22105	0.22105	35.79	35.79
1.10	38.20	0.23157	0.23157	35.78	35.78
1.15	38.20	0.24209	0.24209	35.77	35.77
1.20	38.20	0.25261	0.25261	35.76	35.76
1.25	38.20	0.26313	0.26313	35.75	35.75
1.30	38.20	0.27365	0.27365	35.74	35.74
1.35	38.20	0.28417	0.28417	35.73	35.73
1.40	38.20	0.29469	0.29469	35.72	35.72
1.45	38.20	0.30521	0.30521	35.71	35.71
1.50	38.20	0.31573	0.31573	35.70	35.70
1.55	38.20	0.32625	0.32625	35.69	35.69
1.60	38.20	0.33677	0.33677	35.68	35.68
1.65	38.20	0.34729	0.34729	35.67	35.67
1.70	38.20	0.35781	0.35781	35.66	35.66
1.75	38.20	0.36833	0.36833	35.65	35.65
1.80	38.20	0.37885	0.37885	35.64	35.64
1.85	38.20	0.38937	0.38937	35.63	35.63
1.90	38.20	0.40000	0.40000	35.62	35.62
1.95	38.20	0.41052	0.41052	35.61	35.61
2.00	38.20	0.42105	0.42105	35.60	35.60
2.05	38.20	0.43157	0.43157	35.59	35.59
2.10	38.20	0.44209	0.44209	35.58	35.58
2.15	38.20	0.45261	0.45261	35.57	35.57
2.20	38.20	0.46313	0.46313	35.56	35.56
2.25	38.20	0.47365	0.47365	35.55	35.55
2.30	38.20	0.48417	0.48417	35.54	35.54
2.35	38.20	0.49469	0.49469	35.53	35.53
2.40	38.20	0.50521	0.50521	35.52	35.52
2.45	38.20	0.51573	0.51573	35.51	35.51
2.50	38.20	0.52625	0.52625	35.50	35.50
2.55	38.20	0.53677	0.53677	35.49	35.49
2.60	38.20	0.54729	0.54729	35.48	35.48
2.65	38.20	0.55781	0.55781	35.47	35.47
2.70	38.20	0.56833	0.56833	35.46	35.46
2.75	38.20	0.57885	0.57885	35.45	35.45
2.80	38.20	0.58937	0.58937	35.44	35.44
2.85	38.20	0.60000	0.60000	35.43	35.43
2.90	38.20	0.61052	0.61052	35.42	35.42
2.95	38.20	0.62105	0.62105	35.41	35.41
3.00	38.20	0.63157	0.63157	35.40	35.40
3.05	38.20	0.64209	0.64209	35.39	35.39
3.10	38.20	0.65261	0.65261	35.38	35.38
3.15	38.20	0.66313	0.66313	35.37	35.37
3.20	38.20	0.67365	0.67365	35.36	35.36
3.25	38.20	0.68417	0.68417	35.35	35.35
3.30	38.20	0.69469	0.69469	35.34	35.34
3.35	38.20	0.70521	0.70521	35.33	35.33
3.40	38.20	0.71573	0.71573	35.32	35.32
3.45	38.20	0.72625	0.72625	35.31	35.31
3.50	38.20	0.73677	0.73677	35.30	35.30
3.55	38.20	0.74729	0.74729	35.29	35.29
3.60	38.20	0.75781	0.75781	35.28	35.28
3.65	38.20	0.76833	0.76833	35.27	35.27
3.70	38.20	0.77885	0.77885	35.26	35.26
3.75	38.20	0.78937	0.78937	35.25	35.25
3.80	38.20	0.80000	0.80000	35.24	35.24
3.85	38.20	0.81052	0.81052	35.23	35.23
3.90	38.20	0.82105	0.82105	35.22	35.22
3.95	38.20	0.83157	0.83157	35.21	35.21
4.00	38.20	0.84209	0.84209	35.20	35.20
4.05	38.20	0.85261	0.85261	35.19	35.19
4.10	38.20	0.86313	0.86313	35.18	35.18
4.15	38.20	0.87365	0.87365	35.17	35.17
4.20	38.20	0.88417	0.88417	35.16	35.16
4.25	38.20	0.89469	0.89469	35.15	35.15
4.30	38.20	0.90521	0.90521	35.14	35.14
4.35	38.20	0.91573	0.91573	35.13	35.13
4.40	38.20	0.92625	0.92625	35.12	35.12
4.45	38.20	0.93677	0.93677	35.11	35.11
4.50	38.20	0.94729	0.94729	35.10	35.10
4.55	38.20	0.95781	0.95781	35.09	35.09
4.60	38.20	0.96833	0.96833	35.08	35.08
4.65	38.20	0.97885	0.97885	35.07	35.07
4.70	38.20	0.98937	0.98937	35.06	35.06
4.75	38.20	0.99999	0.99999	35.05	35.05
4.80	38.20	0.00000	0.00000	35.04	35.04
4.85	38.20	0.00000	0.00000	35.03	35.03
4.90	38.20	0.00000	0.00000	35.02	35.02
4.95	38.20	0.00000	0.00000	35.01	35.01
5.00	38.20	0.00000	0.00000	35.00	35.00

CHANGING FREQUENCY AND VOLTAGE EXCITATION FREQUENCY, DATE 17
MARCH 1963, LOCAL TIME 1200Z, 12 OF, 2656 KW 0.556 FT, LOCAL TIME 1200Z, MARCH 17

0.36	36.00	0.01052	0.03157	2334.86	0.0 0.
0.40	36.80	0.01052	0.04216	2339.30	0.0 0.
0.44	37.60	0.01052	0.05262	2337.56	0.0 0.
0.48	37.42	0.01070	0.06338	2339.542	0.0 0.
0.52	38.03	0.01088	0.07426	2336.03	0.0 0.
0.56	38.64	0.01105	0.08525	2336.64	0.0 0.
0.60	39.26	0.01123	0.09616	2337.26	0.0 0.
0.64	39.87	0.00528	0.10758		

DEVIATION AT INLECTION = 0.462
 DEVIATION DECAY TIME = 0.543
 40% LOAD DEVIATION = 0.102
 100% LOAD DEVIATION = 0.246
 100% RECOVERY TIME TO 98.9 PERCENT = 0.765
 100% RECOVERY TIME = 0.765

STEP DOWN THE STANGLING LINE IS 50.00 SECONDS

LOAD RATED AS FOLLOWING
 100% KW IN PCT. H.P. RATING

LOADING 2362
 ADDED 0
 MOTORS 24
 NET LOAD 2460
 33.82
 0.0
 0.23
 0.45

THE ACTUALIZED RESISTIVE LOAD IS 506 KW 3.63 PERCENT FEEDING
 THE ACTUALIZED SYSTEM IMPEDANCE 31153 LB-FT-SORD - 0.56297 2334

THE TORQUE POWER FOR THE MOTORS AT THIS STEP IS 1497.3 KW/H

VOLTAGE STEP UP TOTAL DIP = 0.758
 TOTAL KEY TIME TO 99.5 PERCENT = 0.555
 TOTAL RECOVERY TIME = 0.916
 0.262 0.266

MOTOR NUMBER 4 MOTOR RATING = 75, HP AT 1800, RPM.
 TOTAL LOAD TORQUE IS 25, LB-FT, SMOOTH INERTIA AND WILL HAVE A 21, KW LOAD WITH RUNNING.
 TOTAL LOAD TORQUE IS 25, LB-FT, SMOOTH INERTIA AND WILL HAVE A 21, KW LOAD WITH RUNNING.
 PULLDOWN V = 0, FLG 2 = 2, FLG 3 = 0.

1000 KW = 0.0	KW = 0.0	TIME = 0.1000,	INTEGRATED KW 1000	00
1000 KW = 0.2000,	KW = 0.2000	TIME = 0.1000,	INTEGRATED KW 1000	00
1000 KW = 0.3000,	KW = 0.3000	TIME = 0.1000,	INTEGRATED KW 1000	00
1000 KW = 0.4000,	KW = 0.4000	TIME = 0.1000,	INTEGRATED KW 1000	00
1000 KW = 0.5000,	KW = 0.5000	TIME = 0.1000,	INTEGRATED KW 1000	00
1000 KW = 0.6000,	KW = 0.6000	TIME = 0.1000,	INTEGRATED KW 1000	00
1000 KW = 0.7000,	KW = 0.7000	TIME = 0.1000,	INTEGRATED KW 1000	00
1000 KW = 0.8000,	KW = 0.8000	TIME = 0.1000,	INTEGRATED KW 1000	00
1000 KW = 0.9000,	KW = 0.9000	TIME = 0.1000,	INTEGRATED KW 1000	00
1000 KW = 1.0000,	KW = 1.0000	TIME = 0.1000,	INTEGRATED KW 1000	00
1000 KW = 1.1000,	KW = 1.1000	TIME = 0.1000,	INTEGRATED KW 1000	00
1000 KW = 1.2000,	KW = 1.2000	TIME = 0.1000,	INTEGRATED KW 1000	00
1000 KW = 1.3000,	KW = 1.3000	TIME = 0.1000,	INTEGRATED KW 1000	00
1000 KW = 1.4000,	KW = 1.4000	TIME = 0.1000,	INTEGRATED KW 1000	00
1000 KW = 1.5000,	KW = 1.5000	TIME = 0.1000,	INTEGRATED KW 1000	00
1000 KW = 1.6000,	KW = 1.6000	TIME = 0.1000,	INTEGRATED KW 1000	00
1000 KW = 1.7000,	KW = 1.7000	TIME = 0.1000,	INTEGRATED KW 1000	00
1000 KW = 1.8000,	KW = 1.8000	TIME = 0.1000,	INTEGRATED KW 1000	00
1000 KW = 1.9000,	KW = 1.9000	TIME = 0.1000,	INTEGRATED KW 1000	00
1000 KW = 2.0000,	KW = 2.0000	TIME = 0.1000,	INTEGRATED KW 1000	00

TABLE 1 FREQUENCY OF VOLTAGE DEVIATION FROM 1.000 FOR 1000 KW LOAD AT 120 VOLTS LINE, 1000 KW LOAD, UNIT 2

INPUT TIME = 1.0000, KW = 33,	TIME = 1.3696, INCREMENTAL KW 1.000 = 33,
INPUT TIME = 1.3696, KW = 33,	TIME = 1.6993, INCREMENTAL KW 1.000 = 33,
INPUT TIME = 1.6993, KW = 33,	TIME = 1.3690, INCREMENTAL KW 1.000 = 33,
INPUT TIME = 1.3690, KW = 33,	TIME = 1.9696, INCREMENTAL KW 1.000 = 33,
INPUT TIME = 1.9696, KW = 33,	TIME = 2.0900, INCREMENTAL KW 1.000 = 33,
INPUT TIME = 2.0900, KW = 33,	TIME = 2.1696, INCREMENTAL KW 1.000 = 33,
INPUT TIME = 2.1696, KW = 33,	TIME = 2.1696, INCREMENTAL KW 1.000 = 33,

MAX LOAD KW = 33 AND OCCURS AT 2.40 WITH RECOVERY AT 2.45

TIME	NET OR BIDDED KW	CHANGE IN DEVIATION	NET DEVIATION	NET LOAD KW	AVAILABLE LOAD KW
0.10	24.07	0.00710	0.00710	2413.87	0.0 0.
0.20	24.87	0.00716	0.01424	2413.37	0.0 0.
0.30	24.87	0.00710	0.02134	2413.87	0.0 0.
0.40	25.20	0.00722	0.02856	2413.87	0.0 0.
0.50	25.20	0.00734	0.03577	2413.87	0.0 0.
0.60	25.70	0.00734	0.04297	2413.93	0.0 0.
0.70	26.11	0.00734	0.05017	2414.79	0.0 0.
0.80	26.52	0.00734	0.05737	2415.11	0.0 0.
0.90	26.94	0.00734	0.06457	2415.52	0.0 0.
1.00	28.48	0.00905	0.07280	2415.74	0.0 0.
1.10	28.43	0.00905	0.08095	2417.13	0.0 0.
1.20	30.67	0.00104	0.08928	2418.43	0.0 0.
1.30			0.09109		
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APPENDIX B1
APPENDIX B2

APPENDIX B1

APPENDIX B2

DEPOSITION AT IMPLACEMENT = 0.267
DEPOSITION DEAD TIME = 0.519 0.247
IMPLANTATION =
TIME OF RECOVERY TO 98.9 PERCENT = 0.6
INITIAL RECOVERY TIME = 0.633

1 * 01220040 FREQUENCY AND VOLTAGE EXCURSION PREDICTIONS PROGRAM PAGE 1
 1 * ARKANSAS F & I., S70-205625, 42 OF, 2850 KW @ 500 RPM, 100% LOADS, UNIT 1

1 * ENGINE RATED AT 2850.0 KW AT 900.0 RPM, OF 12 CYLINDER, 1B-F-34572, 1B-F-SQD INERTIA
 1 * WITH CAPABILITY OF 120.0 PERCENT LOAD, AND WITH 34572 CYCLES PER CYCLE
 1 * STELLING MOTOR RATED AT 4063. KW AND 100% THE FOLLOWING PARAMETERS:
 1 *
 1 * ROTATIONAL INERTIA REACTANCE 13.40 PERCENT
 1 * TIME CONVENTIONAL 5.00 SECONDS
 1 * TIME CONVENTIONAL FIELD VOLTAGE 5.72 VOLTS
 1 * NO LOAD FIELD VOLTAGE 5.52 VOLTS
 1 * MAXIMUM FIELD VOLTAGE - FORCING 5.52 VOLTS
 1 * TIME CORRECTED SUB-TRANSIENT REACTANCE IS 21.933 PERCENT

1 * THE POINT FOR DEFINITION OF RECOVERY FOR VOLTAGE IS 90. PERCENT AND FOR FREQUENCY IS 98. PERCENT

1 * THE FOLLOWING CONSTANTS ARE BEING USED FOR THESE COMPUTATIONS:

1 *
 1 * GENERATOR DIP COASTANT 1.675
 1 * EXCITER RECOVERY RATE 2.00
 1 * EXCITER COASTANT 2.00
 1 * MAX TIME LOAD COASTANT IS 0.510
 1 * MAX TIME LOAD FACTOR IS 0.569
 1 * LOAD RECOVERY RATE 0.250 PER SECOND
 1 * LOAD 1.00 INCREMENT PER SECOND FACTOR IS 15.0 25000
 1 * THE TIME INCREMENT IN THE CALCULATION IS 0.10 SECONDS
 1 * VOLTAGE OVERSHOOT CONSTANT IS 0.60
 1 * FLAG 20 SET TO 2
 1 * RACE 2 LOAD COASTANT IS 0.0270
 1 * GEARBOX COEFN FACTOR 1.3569 GOVERNOR DEAD BAND IS 0.1000
 1 * FRICTION WP RATIO = 6.1590
 1 * ACCELERATION_CONSTANT_423 = 0.0034000336 ENGINE/GOV DEAD LINE = 0.342222125

1 * FIELD NO. 1 THE STARTING TIME IS 0.0 SECONDS

1 * THE LOAD FOR ONE 6.0 INERTIA 1B-F-34572 INERTIA PER UNIT RATING

1 *
 1 * EXISTING 0.
 1 * LOAD 246.
 1 * MOTOR 142.
 1 * REFDAD 350.
 1 *
 1 * THE PREDICTED ESTIMATE LOAD IS 34572 KW 1B-F-34572, 1B-F-SQD = 0.6634000361
 1 * THE ACTUALIZED SYSTEM INERTIA IS 34572 CYCLES PER CYCLE = 0.6634000361

1 * THE THROTTLE POWER FOR THE MOTORS AT THIS STEP IS 859. KW AND THE CORRECTED THROTTLE POWER IS 933. KW/6

1 *
 1 * VOLTAGE DIP = 4.724
 1 * LOAD COASTANT VOLTAGE DIP = 0.038
 1 * FREQUENCY TIME TO 90.0 PERCENT = 0.6997
 1 * TOTAL RECOVERY TIME = 0.634

1 * MOTOR NUMBER 1 MOTOR RATING = 150. KW AT 1800. RPM
 1 * THE MOTOR HAS 150. KW-F-34572 INERTIA AND WILL HAVE A 442. KW LOAD WHEN RUNNING.
 1 * THE LOAD TORQUE IS 324. NM AND THE INERTIA IS 34572 CYCLES PER CYCLE.
 1 * TIME 1 = 0, FLAG 2 = 1, FLAG 3 = 0.

1 *
 1 * INPUT TIME = 0.0 , KW = 434. TIME = 0.1000, INCREMENTAL KW LOAD = 134.
 1 * TIME = 0.2000, INCREMENTAL KW LOAD = 0.635 0.635
 1 * TIME = 0.3000, INCREMENTAL KW LOAD = 1.31
 1 * TIME = 0.4000, INCREMENTAL KW LOAD = 1.96
 1 * TIME = 0.5000, INCREMENTAL KW LOAD = 2.51
 1 * TIME = 0.5500, INCREMENTAL KW LOAD = 2.88

300000 FREQUENCY AND VOLTAGE EXECUTION PREDICTION PROGRAM PAGE 2
ARITHMES F & L, 520 265925, 12 OF, 2350 KW @ 500 KPH, PSLR LOGS, UNIT 4

APPENDIX B2

	TIME = 0.0000, KW = 145,	TIME = 0.6000, INCREMENTAL KW LOAD = 137,
	TIME = 0.7000, INCREMENTAL KW LOAD = 137,	
	TIME = 0.8000, INCREMENTAL KW LOAD = 141,	
	TIME = 0.9000, INCREMENTAL KW LOAD = 143,	
	TIME = 1.0000, INCREMENTAL KW LOAD = 145,	
	TIME = 1.1000, INCREMENTAL KW LOAD = 152,	
	TIME = 1.2000, INCREMENTAL KW LOAD = 152,	
	TIME = 1.3000, INCREMENTAL KW LOAD = 166,	
	TIME = 1.4000, INCREMENTAL KW LOAD = 172,	
	TIME = 1.5000, INCREMENTAL KW LOAD = 179,	
	TIME = 1.6000, INCREMENTAL KW LOAD = 186,	
	TIME = 1.7000, INCREMENTAL KW LOAD = 194,	
	TIME = 1.8000, INCREMENTAL KW LOAD = 202,	
	TIME = 1.9000, INCREMENTAL KW LOAD = 209,	
	TIME = 2.0000, INCREMENTAL KW LOAD = 216,	
	TIME = 2.0000, KW = 235, AT 13000 SECONDS,	
	WITH PEAK VOLTAGE AT 2.1000	
	PEAK LOAD KW = 230, AND OCCURS AT 2.00 WITH RECOVERY AT 2.33	
	TIME INCREMENTAL LOAD KW CHANGE IN DEVIATION NET DEVIATION	NET LOAD-KW AVAILABLE LOAD-KW
0.10	380.28 0.12930 -0.42936 380.28 0.0 0.	
0.20	380.28 0.12930 0.25859 380.28 0.0 0.	
0.30	380.28 0.12930 0.25732 380.28 0.0 0.	
0.40	380.28 0.12930 0.51749 380.28 0.0 0.	
0.50	380.28 0.89826 0.56752 380.28 0.0 0.	
0.60	382.52 -0.95425 0.48279 382.52 542.07 4.	
0.70	384.76 -0.05892 0.42387 384.76 384.76 7.	
0.80	386.99 -0.06362 0.36025 386.99 574.12 4.	
0.90	389.23 -0.65835 0.29489 389.23 389.23 1.	
1.00	391.47 -0.07311 0.21878 391.47 606.50 1.	
1.10	393.70 -0.37618 0.14666 393.70 237.95 1.	
1.20	396.99 -0.09458 0.08542 404.90 653.66 1.	
	DEVIATION AT INFLECTION = 0.567	
	SYSTEM LOAD TIME = 0.439	
	INFRASTRUCTURE DEVIATION = 0.567	
	PERCENT OF MAXIMUM DEVIATION = 0.43%	
	PERCENT TO 98.0 PERCENT = 0.0	
	TOTAL RECOVERY TIME = 1.264	

1. PROGRAM ARKANSAN P & L, 520,265.925, 42.66, 2650 KW @ 500 KHZ, Rotor Length, 3, UNIT 1

APPENDIX B2

2. STEP NO. 2. THE STARTING TIME IS 4.59 SECONDS
THE LOADS ARE AS FOLLOWING:
LOAD KW HP. PER UNIT RATING

1. SPEED	358.	12.56
2. POWER	663.	0.66
3. LOAD	1024.	35.03

4. THE ACCUMULATED SYSTEM INERTIA IS 246 KW, LB-FT-SECOND = C2P = 0.6033653478

5. THE TORQUE LOWER FOR THE MOTORS AT THIS STEP IS 4921. SEVA AND THE CORRECTED THROTTLE FOWER IS 4924. SEVA
 VOLTAGE DIP = 20.939
 TIME OF MAXIMUM VOLTAGE DIP = 0.431
 TUDAL RECOVERY LINE = 0.492
 0.684 0.148
 MOTOR NUMBER 1 MOTOR RATING = 800 HP AT 835 RPM
 FULL LOAD TORQUE IS 4748 LB-FT-SECOND
 FULL LOAD KW IS 663, AT AN ASSUMED EFFICIENCY OF 90 PERCENT.
 FLAG 1 = 0, FLAG 2 = 0, FLAG 3 = 0.

RATIO - PERCENT	AVGAGE	OUTPUT	INCREMENT									
			STEED	MOTOR	LOAD	MOTOR	LOAD	THE	AV. TERM	NET	SPEED	PERCENT
INCREMENT	TOQUE	TOQUE	TOQUE	TOQUE	SECOND	VOLTAGE	CHANGE	TORQUE	CHARGE	CHARGE	CHARGE	KW
0.0	100.00	45.00	0.0	0.0	0.0	0.0	0.0	50.41	50.41	2.27	2.27	0.0
5.00	100.00	45.00	100.00	100.00	44.50	0.40	0.26	61.92	53.42	1.77	4.63	161.7
10.00	100.00	4.00	100.00	100.00	6.00	0.39	0.39	72.49	65.49	2.26	6.33	960.0
15.00	100.00	3.60	100.00	100.00	3.50	0.70	0.39	83.06	72.06	3.95	6.33	957.7
20.00	100.00	4.00	100.00	100.00	3.50	0.59	0.60	97.66	87.54	9.74	11.73	1064.1
25.00	100.00	6.00	100.00	100.00	5.00	0.70	0.70	100.00	93.50	3.19	11.73	1066.1
30.00	100.00	9.60	100.00	100.00	7.56	0.80	0.20	100.00	95.00	3.14	12.15	1070.0
35.00	100.00	13.00	100.00	100.00	11.00	1.00	1.00	100.00	92.50	3.06	12.49	1073.1
40.00	100.00	17.00	100.00	100.00	15.60	1.20	1.20	100.00	90.00	2.94	12.49	1084.1
45.00	100.00	20.00	100.00	100.00	13.50	1.30	1.30	100.00	85.00	2.81	12.15	1091.0
50.00	100.00	24.00	100.00	100.00	23.00	1.50	1.50	100.00	81.00	2.61	12.15	1098.1
55.00	100.00	31.00	100.00	100.00	28.50	1.70	1.70	100.00	77.00	2.45	12.15	1104.1
60.00	100.00	35.00	100.00	100.00	33.00	2.10	2.10	100.00	71.00	2.24	12.15	1106.0

CAP30040 FREQUENCY AND VOLTAge EXCURSION PREDICTIONS PROGRAM PAGE 4 UNIT 4

45.00	100.00	40.00	100.00	37.50	2.20	100.00	100.00	87.00	2.21	50.32	83.9.
50.00	100.00	40.00	100.00	41.00	2.30	100.00	100.00	67.50	2.07	60.50	87.0.
55.00	100.00	40.00	100.00	41.00	2.30	100.00	100.00	62.50	2.07	62.70	87.0.
60.00	100.00	40.00	100.00	41.00	2.30	100.00	100.00	57.50	2.07	64.00	87.0.
65.00	107.00	53.00	103.50	52.00	2.30	100.00	100.00	51.50	1.85	66.50	87.0.
70.00	121.00	62.00	119.00	58.00	2.30	100.00	100.00	51.50	1.70	70.20	87.0.
75.00	131.00	62.00	121.00	58.00	2.30	100.00	100.00	51.50	1.70	71.50	87.0.
80.00	142.00	62.00	152.00	67.00	3.10	100.00	121.00	67.00	2.05	75.67	77.2.
85.00	149.00	72.00	152.00	67.00	3.10	100.00	121.00	67.00	2.05	72.72	76.8.
90.00	156.00	80.00	163.50	76.00	3.40	100.00	152.00	65.00	2.81	82.57	107.5.
95.00	169.00	90.00	183.50	85.00	3.50	100.00	121.50	102.50	3.55	86.13	126.6.
100.00	180.00	100.00	193.50	95.00	3.60	100.00	103.50	107.50	3.55	85.60	126.8.
105.00	190.00	100.00	200.00	104.50	3.70	100.00	193.50	103.50	3.59	93.26	131.7.
110.00	196.00	100.00	200.00	104.50	3.80	100.00	144.50	50.50	1.67	94.27	93.3.
115.00	200.00	100.00	200.00	104.50	3.90	100.00	144.50	50.50	1.67	96.65	97.5.
120.00	204.00	100.00	200.00	104.50	4.00	100.00	144.50	50.50	1.67	98.27	98.7.
125.00	208.00	100.00	200.00	104.50	4.10	100.00	144.50	50.50	1.67	99.21	99.2.
130.00	212.00	100.00	200.00	104.50	4.20	100.00	144.50	50.50	1.67	99.21	99.2.
135.00	216.00	100.00	200.00	104.50	4.30	100.00	144.50	50.50	1.67	99.21	99.2.
140.00	220.00	100.00	200.00	104.50	4.40	100.00	144.50	50.50	1.67	99.21	99.2.
145.00	224.00	100.00	200.00	104.50	4.50	100.00	144.50	50.50	1.67	99.21	99.2.
150.00	228.00	100.00	200.00	104.50	4.60	100.00	144.50	50.50	1.67	99.21	99.2.
155.00	232.00	100.00	200.00	104.50	4.70	100.00	144.50	50.50	1.67	99.21	99.2.
160.00	236.00	100.00	200.00	104.50	4.80	100.00	144.50	50.50	1.67	99.21	99.2.
165.00	240.00	100.00	200.00	104.50	4.90	100.00	144.50	50.50	1.67	99.21	99.2.
170.00	244.00	100.00	200.00	104.50	5.00	100.00	144.50	50.50	1.67	99.21	99.2.
175.00	248.00	100.00	200.00	104.50	5.10	100.00	144.50	50.50	1.67	99.21	99.2.
180.00	252.00	100.00	200.00	104.50	5.20	100.00	144.50	50.50	1.67	99.21	99.2.
185.00	256.00	100.00	200.00	104.50	5.30	100.00	144.50	50.50	1.67	99.21	99.2.
190.00	260.00	100.00	200.00	104.50	5.40	100.00	144.50	50.50	1.67	99.21	99.2.
195.00	264.00	100.00	200.00	104.50	5.50	100.00	144.50	50.50	1.67	99.21	99.2.
200.00	268.00	100.00	200.00	104.50	5.60	100.00	144.50	50.50	1.67	99.21	99.2.
205.00	272.00	100.00	200.00	104.50	5.70	100.00	144.50	50.50	1.67	99.21	99.2.
210.00	276.00	100.00	200.00	104.50	5.80	100.00	144.50	50.50	1.67	99.21	99.2.
215.00	280.00	100.00	200.00	104.50	5.90	100.00	144.50	50.50	1.67	99.21	99.2.
220.00	284.00	100.00	200.00	104.50	6.00	100.00	144.50	50.50	1.67	99.21	99.2.
225.00	288.00	100.00	200.00	104.50	6.10	100.00	144.50	50.50	1.67	99.21	99.2.
230.00	292.00	100.00	200.00	104.50	6.20	100.00	144.50	50.50	1.67	99.21	99.2.
235.00	296.00	100.00	200.00	104.50	6.30	100.00	144.50	50.50	1.67	99.21	99.2.
240.00	300.00	100.00	200.00	104.50	6.40	100.00	144.50	50.50	1.67	99.21	99.2.
245.00	304.00	100.00	200.00	104.50	6.50	100.00	144.50	50.50	1.67	99.21	99.2.
250.00	308.00	100.00	200.00	104.50	6.60	100.00	144.50	50.50	1.67	99.21	99.2.
255.00	312.00	100.00	200.00	104.50	6.70	100.00	144.50	50.50	1.67	99.21	99.2.
260.00	316.00	100.00	200.00	104.50	6.80	100.00	144.50	50.50	1.67	99.21	99.2.
265.00	320.00	100.00	200.00	104.50	6.90	100.00	144.50	50.50	1.67	99.21	99.2.
270.00	324.00	100.00	200.00	104.50	7.00	100.00	144.50	50.50	1.67	99.21	99.2.
275.00	328.00	100.00	200.00	104.50	7.10	100.00	144.50	50.50	1.67	99.21	99.2.
280.00	332.00	100.00	200.00	104.50	7.20	100.00	144.50	50.50	1.67	99.21	99.2.
285.00	336.00	100.00	200.00	104.50	7.30	100.00	144.50	50.50	1.67	99.21	99.2.
290.00	340.00	100.00	200.00	104.50	7.40	100.00	144.50	50.50	1.67	99.21	99.2.
295.00	344.00	100.00	200.00	104.50	7.50	100.00	144.50	50.50	1.67	99.21	99.2.
300.00	348.00	100.00	200.00	104.50	7.60	100.00	144.50	50.50	1.67	99.21	99.2.
305.00	352.00	100.00	200.00	104.50	7.70	100.00	144.50	50.50	1.67	99.21	99.2.
310.00	356.00	100.00	200.00	104.50	7.80	100.00	144.50	50.50	1.67	99.21	99.2.
315.00	360.00	100.00	200.00	104.50	7.90	100.00	144.50	50.50	1.67	99.21	99.2.
320.00	364.00	100.00	200.00	104.50	8.00	100.00	144.50	50.50	1.67	99.21	99.2.
325.00	368.00	100.00	200.00	104.50	8.10	100.00	144.50	50.50	1.67	99.21	99.2.
330.00	372.00	100.00	200.00	104.50	8.20	100.00	144.50	50.50	1.67	99.21	99.2.
335.00	376.00	100.00	200.00	104.50	8.30	100.00	144.50	50.50	1.67	99.21	99.2.
340.00	380.00	100.00	200.00	104.50	8.40	100.00	144.50	50.50	1.67	99.21	99.2.
345.00	384.00	100.00	200.00	104.50	8.50	100.00	144.50	50.50	1.67	99.21	99.2.
350.00	388.00	100.00	200.00	104.50	8.60	100.00	144.50	50.50	1.67	99.21	99.2.
355.00	392.00	100.00	200.00	104.50	8.70	100.00	144.50	50.50	1.67	99.21	99.2.
360.00	396.00	100.00	200.00	104.50	8.80	100.00	144.50	50.50	1.67	99.21	99.2.
365.00	400.00	100.00	200.00	104.50	8.90	100.00	144.50	50.50	1.67	99.21	99.2.
370.00	404.00	100.00	200.00	104.50	9.00	100.00	144.50	50.50	1.67	99.21	99.2.
375.00	408.00	100.00	200.00	104.50	9.10	100.00	144.50	50.50	1.67	99.21	99.2.
380.00	412.00	100.00	200.00	104.50	9.20	100.00	144.50	50.50	1.67	99.21	99.2.
385.00	416.00	100.00	200.00	104.50	9.30	100.00	144.50	50.50	1.67	99.21	99.2.
390.00	420.00	100.00	200.00	104.50	9.40	100.00	144.50	50.50	1.67	99.21	99.2.
395.00	424.00	100.00	200.00	104.50	9.50	100.00	144.50	50.50	1.67	99.21	99.2.
400.00	428.00	100.00	200.00	104.50	9.60	100.00	144.50	50.50	1.67	99.21	99.2.
405.00	432.00	100.00	200.00	104.50	9.70	100.00	144.50	50.50	1.67	99.21	99.2.
410.00	436.00	100.00	200.00	104.50	9.80	100.00	144.50	50.50	1.67	99.21	99.2.
415.00	440.00	100.00	200.00	104.50	9.90	100.00	144.50	50.50	1.67	99.21	99.2.
420.00	444.00	100.00	200.00	104.50	10.00	100.00	144.50	50.50	1.67	99.21	99.2.
425.00	448.00	100.00	200.00	104.50	10.10	100.00	144.50	50.50	1.67	99.21	99.2.
430.00	452.00	100.00	200.00	104.50	10.20	100.00	144.50	50.50	1.67	99.21	99.2.
435.00	456.00	100.00	200.00	104.50	10.30	100.00	144.50	50.50	1.67	99.21	99.2.
440.00	460.00	100.00	200.00	104.50	10.40	100.00	144.50	50.50	1.67	99.21	99.2.
445.00	464.00	100.00	200.00	104.50	10.50	100.00	144.50	50.50	1.67	99.21	99.2.
450.00	468.00	100.00	200.00	104.50	10.60	100.00	144.50	50.50	1.67	99.21	99.2.
455.00	472.00	100.00	200.00	104.50	10.70	100.00	144.50	50.50	1.67	99.21	99.2.
460.00	476.00	100.00	200.00	104.50	10.80	100.00	144.50	50.50	1.67	99.21	99.2.
465.00	480.00	100.00	200.00	104.50	10.90	100.00	144.50</td				

STEP NO. 3 THE STARTING TIME IS 10.00 SECONDS

THE LOADS ARE AS FOLLOWS:

LOAD KW HP UNIT RATING

100.00 10.00 34.50

61.00 9.00 17.00

80.00 8.00 31.00

43.22 4.322 1.322

THE ACCUMULATED RESISTIVE LOAD IS 346.22 KW

THE ACCUMULATED SYSTEM INERTIA IS 397.22 KI-LB-FT-SQFT

PERCENT FATING = 0.0005922176

THE THROTTLE POWER FOR THE MOTORS AT THIS STEP IS 353.1 KW AND THE CORRECTED THROTTLE POWER IS 353.1 KW

VOLTAGE DIP = 16.01%

MAXIMUM VOLTAGE DIP = 9.16%

RECUPERATION TIME TO 20.0 PERCENT = 6.363

TOTAL DELAYED LINE = 0.647

0.113

MOTOR NUMBER 1 MOTOR RATING = 600 HP @ 3575 RPM

THE MOTOR HAS BEEN SQUARED INERTIA AND WILL HAVE A 100% LOAD CAPACITY.

INITIAL LOAD TORQUE IS 881 LB-FT

FINAL LOAD KW IS 477. AT AN ASSUMED EFFICIENCY OF 90 PERCENT,

FLAG 1 = 0, FLAG 2 = 0, FLAG 3 = 0.

MOTORS PERCENT AVERAGE OUTPUT

PERCENT CORRECTED FERENT INERTIA ACCUM. INERTIA

SPEED MOTOR LOAD TIME AV. TERM MOTOR NET SPEED FERENT

INCREMENT TORQUE TORQUE SECIDE SECIDE VOLTAGE TORQUE TORQUE CHARGE SPEED

0.0 70.00 15.00 12.00 0.0 0.10 22.00 52.66 41.69 2.00 1.80 0.00 0.0

0.5 71.00 15.00 12.00 0.20 22.76 53.09 41.69 2.00 1.80 3.00 0.00

10.00 73.00 5.00 7.00 0.30 23.56 54.76 41.69 2.00 1.80 6.00 0.00

15.00 74.00 4.00 73.56 0.50 100.00 75.60 54.76 2.12 2.22 9.00 0.00

20.00 76.00 4.00 75.00 0.70 100.00 75.60 54.76 2.12 2.22 12.00 0.00

25.00 78.00 6.00 77.00 5.00 0.90 100.00 75.60 54.76 2.12 2.22 15.00 0.00

30.00 81.00 8.00 79.50 7.00 0.90 100.00 75.60 54.76 2.12 2.22 18.00 0.00

35.00 84.00 10.00 82.50 9.00 1.10 100.00 75.50 54.76 2.12 2.22 21.00 0.00

40.00 88.00 14.00 86.00 12.00 1.20 100.00 75.50 54.76 2.12 2.22 24.00 0.00

45.00 92.00 17.00 90.50 15.50 1.30 100.00 75.50 54.76 2.12 2.22 27.00 0.00

50.00 106.00 22.00 99.50 19.50 1.50 100.00 75.50 54.76 2.12 2.22 30.00 0.00

55.00 123.00 26.00 114.50 24.00 1.60 100.00 75.50 54.76 2.12 2.22 33.00 0.00

60.00 141.00 31.00 132.00 28.50 1.70 100.00 75.50 54.76 2.12 2.22 36.00 0.00

65.00 156.00 37.00 148.50 37.00 1.80 100.00 75.50 54.76 2.12 2.22 39.00 0.00

70.00 166.00 43.00 161.00 40.00 1.90 100.00 75.50 54.76 2.12 2.22 42.00 0.00

APPROXIMATE FREQUENCY AND VOLTAGE FLICKER PREDICTION PROGRAM, CASE 1, UNIT 4
 60 HZ, 2000 KW, 2850 KW

75.00	172.00	59.00	169.00	46.50	3.00	166.00	161.00	121.00	5.29	66.18	727.
90.00	175.00	57.00	173.50	53.50	2.10	166.00	152.00	122.50	5.36	71.54	947.
95.00	173.00	64.00	174.00	60.50	2.30	166.00	170.00	170.00	5.25	76.77	847.
100.00	160.00	72.00	170.50	68.00	2.30	166.00	173.00	143.50	4.96	81.75	913.
105.00	157.00	80.00	162.50	76.00	2.40	166.00	170.50	102.50	4.48	86.23	879.
110.00	100.00	83.00	176.50	84.00	2.50	166.00	167.50	86.50	3.70	90.01	845.
					2.60	166.00	167.50	84.50	3.20	92.76	831.
					2.70	166.00	169.00	81.50	1.95	95.71	553.
					2.80	166.00	169.50	81.50	1.95	97.60	610.
					2.90	166.00	170.00	81.50	1.95	98.54	610.

TOTAL EQUIVALENT ENERGY = 739.02642

DEGREE OF SEVERITY = 1.49.59781

PERCENT LOAD = 94.2.412.26000SECONDS

FROM 100% LOAD OCCURS AT 2.70 WITH RECOVERY AT 3.82
MAX. OVERVOLTAGE OCCURS AT 2.70 WITH RECOVERY AT 3.82

TIME	INCREMENTAL LOAD-KW	CHANGE IN DEVIATION	NET DEVIATION	NET LOAD-KW	AVAILABLE LOAD-KW
0.10	562.50	0.17444	0.17444	1562.50	0.0 0 0
0.20	573.50	0.16923	0.34367	1533.50	0.0 0 0
0.30	632.23	0.18826	0.53193	1463.23	0.0 0 0
0.40	603.20	0.20247	0.73551	1463.20	0.0 0 0
0.50	623.72	0.02923	0.45623	1673.72	2067.62 2.
0.60	682.66	-0.13369	0.34367	1669.66	2119.35 2.
0.70	578.02	-0.15188	0.38666	1838.02	2171.28 2.
0.80	676.23	-0.16779	0.49894	1656.23	2223.22 2.
0.90	861.49	0.18664	0.01217	1693.49	8973.25 2.

DEVIATION AT INJECTION = 8.756

MAXIMUM DEVIATION = 0.756

TIME OF MAXIMUM DEVIATION = 0.410

TIME OF FREQUENCY RECOVERY = 0.6

TOTAL FLOWDOWN TIME = 0.656

STEP POINT 4 THE STANDBY TIME IS 45.00 SECONDS

THE LOAD DUE TO THE FOLLOWING PER UNIT RATING

FADING 1287.

CHILLED WATER 41.0.

MOTORS 41.4.

NET LOAD 1701.

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THE ACCUMULATED SYSTEM INERTIA IS 348.5 KW, THE FT-SPEC PERCENT RATING IS 9.65%, THE FT-SPEC PERCENT RATING IS 9.65%

1. 4000, 5000 FREQUENCY AND VOLTAGE CYCLES FOR THE MOTORS AT THIS STEP 1.
2. 5/0 2000 RPM, 4200, 2050 KW @ 90% KPH, FULL LOAD, UNIT 1.

THE THRUST POWER FOR THE MOTORS AT THIS STEP 1. 2954, 5KVA

VOLTAGE DUE TO MAXIMUM VOLTAGE RIP = 43.753
EFFICIENCY DUE TO 50% PERCENT = 0.533
TOTAL RECOVERY TIME = 0.368

MOTOR NUMBER 1 MOTOR RATING = 500 HP AT 1780 RPM
THE MOTOR HAS 310 LB-FT SQUARED INERTIA AND WILL HAVE A 166, KW LOAD WHEN RUNNING.
FULL LOAD TORQUE = 4245 LB-FT.
LOAD KW = 12.483 AT 50% ASSURED EFFICIENCY OF 90 PERCENT.
FILE 1 = 0, FILE 2 = 0, FILE 3 = 0.

INPUTS- PERCENT AVERAGE

STEP	NUMBER	MOTOR	LOAD	POWER	LOAD	TIME	PERCENT	CORRECTED	PERCENT	INCREMENT	ACCUM.	INCREMENT
						SECONDS	AV. SPEED	COEF	MET	STEPS	KW	KW
1	0.0	100.00	100.00	15.00	101.00	12.00	0.0				0.0	311.
2	5.00	102.00	9.00	102.50	7.50	0.10	-23.22	-22.00	-34.52	-6.72	-5.52	
3	10.00	104.00	4.00	103.50	5.00	0.20	-17.73	-33.33	-13.33	-6.46	-13.13	-615.
4	15.00	107.00	4.00	105.50	4.00	0.30	-26.30	-100.63	-96.43	-7.92	-21.10	-62.
5	20.00	113.00	8.00	111.50	6.50	0.40	-92.77	-111.04	-104.54	-6.61	-29.74	-572.
6	25.00	117.00	12.00	115.00	11.50	0.50	-160.00	-117.00	-107.50	-9.86	-30.57	-554.
7	30.00	122.00	17.00	120.00	15.00	0.60	-160.00	-117.00	-107.50	-10.44	-30.57	-554.
8	35.00	125.00	22.00	123.00	18.00	0.70	-160.00	-117.00	-107.50	-10.44	-30.57	-554.
9	40.00	142.00	26.00	137.00	24.00	0.80	-160.00	-117.00	-107.50	-8.98	-47.55	-595.
10	45.00	164.00	31.00	151.00	28.50	0.70	-160.00	-117.00	-107.50	-10.44	-57.64	-735.
11	50.00	182.00	37.00	153.00	31.00	0.70	-160.00	-117.00	-107.50	-10.44	-57.64	-735.
12	55.00	193.00	42.00	165.00	39.50	0.70	-160.00	-117.00	-107.50	-10.44	-57.64	-735.
13	60.00	192.00	49.00	195.50	45.50	0.70	-160.00	-117.00	-107.50	-10.44	-57.64	-735.
14	65.00	200.00	56.00	198.00	52.50	0.70	-160.00	-117.00	-107.50	-10.44	-57.64	-735.
15	70.00	196.00	63.00	198.00	59.50	0.70	-160.00	-117.00	-107.50	-10.44	-64.04	-878.
16	75.00	195.00	71.00	199.50	67.00	0.70	-160.00	-117.00	-107.50	-8.42	-89.70	-735.
17	80.00	199.00	87.00	134.00	83.00	1.00	-160.00	-117.00	-107.50	-10.44	-100.00	-562.
18	85.00	199.00	97.00	134.00	83.00	1.00	-160.00	-117.00	-107.50	-10.44	-100.00	-562.
19	90.00	196.00	100.00	134.00	83.00	1.00	-160.00	-117.00	-107.50	-10.44	-100.00	-562.
20	95.00	196.00	100.00	134.00	83.00	1.00	-160.00	-117.00	-107.50	-10.44	-100.00	-562.
21	100.00	199.00	100.00	134.00	83.00	1.00	-160.00	-117.00	-107.50	-10.44	-100.00	-562.
22	105.00	196.00	100.00	134.00	83.00	1.00	-160.00	-117.00	-107.50	-10.44	-100.00	-562.
23	110.00	196.00	100.00	134.00	83.00	1.00	-160.00	-117.00	-107.50	-10.44	-100.00	-562.
24	115.00	196.00	100.00	134.00	83.00	1.00	-160.00	-117.00	-107.50	-10.44	-100.00	-562.
25	120.00	196.00	100.00	134.00	83.00	1.00	-160.00	-117.00	-107.50	-10.44	-100.00	-562.
26	125.00	196.00	100.00	134.00	83.00	1.00	-160.00	-117.00	-107.50	-10.44	-100.00	-562.
27	130.00	196.00	100.00	134.00	83.00	1.00	-160.00	-117.00	-107.50	-10.44	-100.00	-562.
28	135.00	196.00	100.00	134.00	83.00	1.00	-160.00	-117.00	-107.50	-10.44	-100.00	-562.
29	140.00	196.00	100.00	134.00	83.00	1.00	-160.00	-117.00	-107.50	-10.44	-100.00	-562.
30	145.00	196.00	100.00	134.00	83.00	1.00	-160.00	-117.00	-107.50	-10.44	-100.00	-562.
31	150.00	196.00	100.00	134.00	83.00	1.00	-160.00	-117.00	-107.50	-10.44	-100.00	-562.
32	155.00	196.00	100.00	134.00	83.00	1.00	-160.00	-117.00	-107.50	-10.44	-100.00	-562.
33	160.00	196.00	100.00	134.00	83.00	1.00	-160.00	-117.00	-107.50	-10.44	-100.00	-562.
34	165.00	196.00	100.00	134.00	83.00	1.00	-160.00	-117.00	-107.50	-10.44	-100.00	-562.
35	170.00	196.00	100.00	134.00	83.00	1.00	-160.00	-117.00	-107.50	-10.44	-100.00	-562.
36	175.00	196.00	100.00	134.00	83.00	1.00	-160.00	-117.00	-107.50	-10.44	-100.00	-562.
37	180.00	196.00	100.00	134.00	83.00	1.00	-160.00	-117.00	-107.50	-10.44	-100.00	-562.
38	185.00	196.00	100.00	134.00	83.00	1.00	-160.00	-117.00	-107.50	-10.44	-100.00	-562.
39	190.00	196.00	100.00	134.00	83.00	1.00	-160.00	-117.00	-107.50	-10.44	-100.00	-562.
40	195.00	196.00	100.00	134.00	83.00	1.00	-160.00	-117.00	-107.50	-10.44	-100.00	-562.
41	200.00	196.00	100.00	134.00	83.00	1.00	-160.00	-117.00	-107.50	-10.44	-100.00	-562.
42	205.00	196.00	100.00	134.00	83.00	1.00	-160.00	-117.00	-107.50	-10.44	-100.00	-562.
43	210.00	196.00	100.00	134.00	83.00	1.00	-160.00	-117.00	-107.50	-10.44	-100.00	-562.
44	215.00	196.00	100.00	134.00	83.00	1.00	-160.00	-117.00	-107.50	-10.44	-100.00	-562.
45	220.00	196.00	100.00	134.00	83.00	1.00	-160.00	-117.00	-107.50	-10.44	-100.00	-562.
46	225.00	196.00	100.00	134.00	83.00	1.00	-160.00	-117.00	-107.50	-10.44	-100.00	-562.
47	230.00	196.00	100.00	134.00	83.00	1.00	-160.00	-117.00	-107.50	-10.44	-100.00	-562.
48	235.00	196.00	100.00	134.00	83.00	1.00	-160.00	-117.00	-107.50	-10.44	-100.00	-562.
49	240.00	196.00	100.00	134.00	83.00	1.00	-160.00	-117.00	-107.50	-10.44	-100.00	-562.
50	245.00	196.00	100.00	134.00	83.00	1.00	-160.00	-117.00	-107.50	-10.44	-100.00	-562.
51	250.00	196.00	100.00	134.00	83.00	1.00	-160.00	-117.00	-107.50	-10.44	-100.00	-562.
52	255.00	196.00	100.00	134.00	83.00	1.00	-160.00	-117.00	-107.50	-10.44	-100.00	-562.
53	260.00	196.00	100.00	134.00	83.00	1.00	-160.00	-117.00	-107.50	-10.44	-100.00	-562.
54	265.00	196.00	100.00	134.00	83.00	1.00	-160.00	-117.00	-107.50	-10.44	-100.00	-562.
55	270.00	196.00	100.00	134.00	83.00	1.00	-160.00	-117.00	-107.50	-10.44	-100.00	-562.
56	275.00	196.00	100.00	134.00	83.00	1.00	-160.00	-117.00	-107.50	-10.44	-100.00	-562.
57	280.00	196.00	100.00	134.00	83.00	1.00	-160.00	-117.00	-107.50	-10.44	-100.00	-562.
58	285.00	196.00	100.00	134.00	83.00	1.00	-160.00	-117.00	-107.50	-10.44	-100.00	-562.
59	290.00	196.00	100.00	134.00	83.00	1.00	-160.00	-117.00	-107.50	-10.44	-100.00	-562.
60	295.00	196.00	100.00	134.00	83.00	1.00	-160.00	-117.00	-107.50	-10.44	-100.00	-562.
61	300.00	196.00	100.00	134.00	83.00	1.00	-160.00	-117.00	-107.50	-10.44	-100.00	-562.
62	305.00	196.00	100.00	134.00	83.00	1.00	-160.00	-117.00	-107.50	-10.44	-100.00	-562.
63	310.00	196.00	100.00	134.00	83.00	1.00	-160.00	-117.00	-107.50	-10.44	-100.00	-562.
64	315.00	196.00	100.00	134.00	83.00	1.00	-160.00	-117.00	-107.50	-10.44	-100.00	-562.
65	320.00	196.00	100.00	134.00	83.00	1.00	-160.00	-117.00	-107.50	-10.44	-100.00	-562.
66	325.00	196.00	100.00	134.00	83.00	1.00	-160.00	-117.00	-107.50	-10.44	-100.00	-562.
67	330.00	196.00	100.00	134.00	83.00	1.00	-160.00	-117.00	-107.50	-10.44	-100.00	-562.
68	335.00	196.00	100.00	134.00	83.00	1.00	-160.00	-117.00	-107.50	-10.44	-100.00	-562.
69	340.00	196.00	100.00	134.00	83.00	1.00	-160.00	-117.00	-107.50	-10.44	-100.00	-562.
70	345.00	196.00	100.00	134.00	83.00	1.00	-160.00	-117.00	-107.50	-10.44	-100.00	-562.
71	350.00	196.00	100.00	134.00	83.00	1.00	-160.00	-117.00	-107.50	-10.44	-100.00	-562.
72	355.00	196.00	100.00	134.00	83.00	1.00	-160.00	-117.00	-107.50	-10.44	-100.00	-562.
73	360.00	196.00	100.00	134.00	83.00	1.00	-160.00	-117.00	-107.50	-10.44	-100.00	-562.
74	365.00	196.00	100.00	134.00	83.00	1.00	-160.00	-117.00	-107.50	-10.44	-100.00	-562.
75	370.00	196.00	100.00	134.00	83.00	1.00	-160.00	-117.00	-107.50	-10.44	-100.00	-562.
76	375.00	196.00	100.00	134.00	83.00	1.00	-160.00	-117.00	-107.50	-10.44	-100.00	-562.
77												

INTEGRATION FREQUENCY AND VOLTAGE ENHANCEMENT PREDICTION PROGRAM
PAGE 4
ARRANGEMENT B, 570 KW 200/25, 12 OF, 2650 KW @ 500 KVA, HSI K LOADS, UNIT A

APPENDIX B2

TOTAL EQUIVALENT ENERGY = 655.92437		NET DEVIATION		NET LOAD-KW AVAILABLE LOAD-KW	
PERCENT SEVERITY LOAD = 615.61 PERCENT		0.15780		2428.25, 0.0, 0.	
MAX. OVERVOLTAGE = 315. AND OCCURS AT 1.50		0.16025		3123.73, 0.0, 0.	
MAX. OVERVOLTAGE OCCURS AT 1.50 WITH RECOVERY AT 2.24		0.17831		2192.09, 0.0, 0.	
TIME INCREMENTAL LOAD-KW CHANGE IN DEVIATION		0.48533		2216.32, 0.0, 0.	
0.10 551.25 0.15780		0.49020		2203.63, 2654.05, 2.	
0.20 552.79 0.16025		-0.10078		2226.95, 2693.36, 2.	
0.30 615.09 0.17831		0.47836		2229.00, 2733.62, 2.	
0.40 639.32 0.48533		0.49369		2310.48, 2770.70, 2.	
0.50 631.63 0.62312		0.62312		2384.55, 2812.04, 2.	
DEVIATION AT INFLECTION = 0.724		0.48794		2229.00, 2733.62, 2.	
SYSTEM DEAD TIME = 0.252		-0.13521		2229.00, 2733.62, 2.	
HORIZONTAL DEVIATION		0.724		2229.00, 2733.62, 2.	
TIME OF MAXIMUM DEVIATION = 0.152		0.34150		2229.00, 2733.62, 2.	
TIME OF RECOVERY TO 98.0 PERCENT = 0.963		0.29754		2229.00, 2733.62, 2.	
TOTAL RECOVERY TIME = 0.963		0.08559		2229.00, 2733.62, 2.	
DEVIATION AT INFLECTION = 0.724		0.48794		2229.00, 2733.62, 2.	
SYSTEM DEAD TIME = 0.252		-0.13521		2229.00, 2733.62, 2.	
HORIZONTAL DEVIATION		0.724		2229.00, 2733.62, 2.	
TIME OF MAXIMUM DEVIATION = 0.152		0.34150		2229.00, 2733.62, 2.	
TIME OF RECOVERY TO 98.0 PERCENT = 0.963		0.29754		2229.00, 2733.62, 2.	
TOTAL RECOVERY TIME = 0.963		0.08559		2229.00, 2733.62, 2.	

THE TOTAL TIME IS 36.06 SECONDS.
THE LOADS ARE AS FOLLOWS:

LOAD KW HP PER UNIT RATING

EXISTING 1954,
ADDED 0,
REMOVED 0,
NET LOAD 2041.

60.56
0.0
3.05
3.62

THE ACCUMULATED PESTIVE LOAD IS 4030.3, LB-FT-SQUARE = 0.623751367

THE ACCUMULATED SYSTEM INERTIA IS 536. SKWN AND THE CORRECTED THRUSH POWER IS 536. SKWN

THE THRUSH POWER FOR THE MOTORS AT THIS STEP IS 536. SKWN

TOTAL DIP = 27.613
TIME OF MAXIMUM VOLTAGE DIP = 0.618
TOTAL RECOVERY TIME = 0.657
0.069 0.626

MOTOR NUMBER: 1 MOTOR RATING: 105. NET 1775 RPM.
 THE MOTOR HAS 0.5 LB-FT SQUARED TORQUE AND WILL HAVE A 65. KW LOAD WHEN RUNNING.
 FULL LOAD TORQUE IS 341.1 LB-FT.
 FULL LOAD RPM IS 67. AT 60 ASSUMED EFFICIENCY OF 90% EFFCFL.

THRU'S PERCENT VOLTAGE OUTPUT -

STATED	HOLD	LOAD	TIME	LINe	PERCENT	CORRECTED	PERCENT	INCREMENT	ACCUM.	INCREMENT
THRU'S	VOLTAGE	TORQUE	TORQUE	SECONDS	VOLTAGE	TORQUE	TORQUE	CHARGE	SPEED	V.M.
0.00	259.00	0.01	259.00	0.01	259.00	0.01	0.01	0.00	0.0	0.0
0.05	242.00	0.10	234.50	0.06	234.50	0.06	0.05	0.00	0.0	0.0
0.10	216.00	0.34	224.50	0.22	224.50	0.22	0.16	100.00	221.28	14.03
0.15	197.00	0.70	211.50	0.52	211.50	0.52	0.20	100.00	221.28	14.03
0.20	189.00	1.56	202.00	1.13	202.00	1.13	0.20	100.00	221.28	14.03
0.25	189.00	2.70	193.00	2.13	193.00	2.13	0.20	100.00	221.28	14.03
0.30	183.00	4.25	186.00	3.47	186.00	3.47	0.30	100.00	179.56	174.16
0.35	176.00	6.40	172.50	5.34	172.50	5.34	0.30	100.00	179.56	174.16
0.40	171.00	9.44	173.50	7.76	173.50	7.76	0.40	100.00	174.16	174.16
0.45	166.00	12.50	168.50	10.81	168.50	10.81	0.40	100.00	174.16	174.16
0.50	162.00	16.60	164.00	14.57	164.00	14.57	0.50	100.00	174.16	174.16
0.55	154.00	21.50	151.50	19.12	151.50	19.12	0.50	100.00	174.16	174.16
0.60	141.00	27.46	161.00	24.53	161.00	24.53	0.60	100.00	174.16	174.16
0.65	134.00	32.30	162.50	30.86	162.50	30.86	0.70	100.00	174.16	174.16
0.70	128.00	42.41	182.50	38.24	182.50	38.24	0.70	100.00	174.16	174.16
0.75	123.00	51.20	172.50	46.67	172.50	46.67	0.80	100.00	174.16	174.16
0.80	117.00	61.21	155.50	56.31	155.50	56.31	0.80	100.00	174.16	174.16
0.85	113.00	72.90	203.00	67.16	203.00	67.16	0.90	100.00	174.16	174.16
0.90	113.00	85.74	203.00	79.32	203.00	79.32	0.90	100.00	174.16	174.16
0.95	113.00	106.76	203.00	92.87	203.00	92.87	1.00	100.00	174.16	174.16
1.00	113.00	134.93	203.00	110.13	203.00	110.13	1.10	100.00	174.16	174.16
1.05	113.00	167.22	203.00	132.87	203.00	132.87	1.10	100.00	174.16	174.16
1.10	113.00	205.56	203.00	167.22	203.00	167.22	1.10	100.00	174.16	174.16
1.15	113.00	247.83	203.00	205.56	203.00	205.56	1.10	100.00	174.16	174.16
1.20	113.00	300.00	203.00	247.83	203.00	247.83	1.10	100.00	174.16	174.16
1.25	113.00	362.17	203.00	300.00	203.00	300.00	1.10	100.00	174.16	174.16
1.30	113.00	434.34	203.00	362.17	203.00	362.17	1.10	100.00	174.16	174.16
1.35	113.00	516.51	203.00	434.34	203.00	434.34	1.10	100.00	174.16	174.16
1.40	113.00	608.68	203.00	516.51	203.00	516.51	1.10	100.00	174.16	174.16
1.45	113.00	700.85	203.00	608.68	203.00	608.68	1.10	100.00	174.16	174.16
1.50	113.00	793.02	203.00	700.85	203.00	700.85	1.10	100.00	174.16	174.16
1.55	113.00	885.19	203.00	793.02	203.00	793.02	1.10	100.00	174.16	174.16
1.60	113.00	977.36	203.00	885.19	203.00	885.19	1.10	100.00	174.16	174.16
1.65	113.00	1069.53	203.00	977.36	203.00	977.36	1.10	100.00	174.16	174.16
1.70	113.00	1161.70	203.00	1069.53	203.00	1069.53	1.10	100.00	174.16	174.16
1.75	113.00	1253.87	203.00	1161.70	203.00	1161.70	1.10	100.00	174.16	174.16
1.80	113.00	1346.04	203.00	1253.87	203.00	1253.87	1.10	100.00	174.16	174.16
1.85	113.00	1438.21	203.00	1346.04	203.00	1346.04	1.10	100.00	174.16	174.16
1.90	113.00	1530.38	203.00	1438.21	203.00	1438.21	1.10	100.00	174.16	174.16
1.95	113.00	1622.55	203.00	1530.38	203.00	1530.38	1.10	100.00	174.16	174.16
2.00	113.00	1714.72	203.00	1622.55	203.00	1622.55	1.10	100.00	174.16	174.16
2.05	113.00	1806.89	203.00	1714.72	203.00	1714.72	1.10	100.00	174.16	174.16
2.10	113.00	1899.06	203.00	1806.89	203.00	1806.89	1.10	100.00	174.16	174.16
2.15	113.00	1991.23	203.00	1899.06	203.00	1899.06	1.10	100.00	174.16	174.16
2.20	113.00	2083.40	203.00	1991.23	203.00	1991.23	1.10	100.00	174.16	174.16
2.25	113.00	2175.57	203.00	2083.40	203.00	2083.40	1.10	100.00	174.16	174.16
2.30	113.00	2267.74	203.00	2175.57	203.00	2175.57	1.10	100.00	174.16	174.16
2.35	113.00	2360.91	203.00	2267.74	203.00	2267.74	1.10	100.00	174.16	174.16
2.40	113.00	2453.08	203.00	2360.91	203.00	2360.91	1.10	100.00	174.16	174.16
2.45	113.00	2545.25	203.00	2453.08	203.00	2453.08	1.10	100.00	174.16	174.16
2.50	113.00	2637.42	203.00	2545.25	203.00	2545.25	1.10	100.00	174.16	174.16
2.55	113.00	2729.59	203.00	2637.42	203.00	2637.42	1.10	100.00	174.16	174.16
2.60	113.00	2821.76	203.00	2729.59	203.00	2729.59	1.10	100.00	174.16	174.16
2.65	113.00	2913.93	203.00	2821.76	203.00	2821.76	1.10	100.00	174.16	174.16
2.70	113.00	3006.10	203.00	2913.93	203.00	2913.93	1.10	100.00	174.16	174.16
2.75	113.00	3098.27	203.00	3006.10	203.00	3006.10	1.10	100.00	174.16	174.16
2.80	113.00	3190.44	203.00	3098.27	203.00	3098.27	1.10	100.00	174.16	174.16
2.85	113.00	3282.61	203.00	3190.44	203.00	3190.44	1.10	100.00	174.16	174.16
2.90	113.00	3374.78	203.00	3282.61	203.00	3282.61	1.10	100.00	174.16	174.16
2.95	113.00	3466.95	203.00	3374.78	203.00	3374.78	1.10	100.00	174.16	174.16
3.00	113.00	3559.12	203.00	3466.95	203.00	3466.95	1.10	100.00	174.16	174.16
3.05	113.00	3651.29	203.00	3559.12	203.00	3559.12	1.10	100.00	174.16	174.16
3.10	113.00	3743.46	203.00	3651.29	203.00	3651.29	1.10	100.00	174.16	174.16
3.15	113.00	3835.63	203.00	3743.46	203.00	3743.46	1.10	100.00	174.16	174.16
3.20	113.00	3927.80	203.00	3835.63	203.00	3835.63	1.10	100.00	174.16	174.16
3.25	113.00	4020.97	203.00	3927.80	203.00	3927.80	1.10	100.00	174.16	174.16
3.30	113.00	4113.14	203.00	4020.97	203.00	4020.97	1.10	100.00	174.16	174.16
3.35	113.00	4205.31	203.00	4113.14	203.00	4113.14	1.10	100.00	174.16	174.16
3.40	113.00	4297.48	203.00	4205.31	203.00	4205.31	1.10	100.00	174.16	174.16
3.45	113.00	4390.65	203.00	4297.48	203.00	4297.48	1.10	100.00	174.16	174.16
3.50	113.00	4482.82	203.00	4390.65	203.00	4390.65	1.10	100.00	174.16	174.16
3.55	113.00	4575.00	203.00	4482.82	203.00	4482.82	1.10	100.00	174.16	174.16
3.60	113.00	4667.17	203.00	4575.00	203.00	4575.00	1.10	100.00	174.16	174.16
3.65	113.00	4759.34	203.00	4667.17	203.00	4667.17	1.10	100.00	174.16	174.16
3.70	113.00	4851.51	203.00	4759.34	203.00	4759.34	1.10	100.00	174.16	174.16
3.75	113.00	4943.68	203.00	4851.51	203.00	4851.51	1.10	100.00	174.16	174.16
3.80	113.00	5035.85	203.00	4943.68	203.00	4943.68	1.10	100.00	174.16	174.16
3.85	113.00	5128.02	203.00	5035.85	203.00	5035.85	1.10	100.00	174.16	174.16
3.90	113.00	5220.19	203.00	5128.02	203.00	5128.02	1.10	100.00	174.16	174.16
3.95	113.00	5312.36	203.00	5220.19	203.00	5220.19	1.10	100.00	174.16	174.16
4.00	113.00	5404.53	203.00	5312.36	203.00	5312.36	1.10	100.00	174.16	174.16
4.05	113.00	5496.70	203.00	5404.53	203.00	5404.53	1.10	100.00	174.16	174.16
4.10	113.00	5588.87	203.00	5496.70	203.00	5496.70	1.10	100.00	174.16	174.16
4.15	113.00	5681.04	203.00	5588.87	203.00	5588.87	1.10	100.00	174.16	174.16
4.20	113.00	5773.21	203.00	5681.04	203.00	5681.04	1.10	100.00	174.16	174.16
4.25	113.00	5865.38	203.00	5773.2						

APPENDIX B2
FREQUENCY AND VOLTAGE EXCITATION PREDICTION PROGRAM PAGE 43
MARKANAE P & L, 520 265225, 12 OF, 2050 KW @ 500 RPM, ASLP LOAD, UNIT 4

APPENDIX B2

INLECTION AT INLECTION =	0.332
INLECTION DEVIATION =	0.576
LINEAR DEVIATION =	0.340
LINEAR RECOVERY TIME =	0.376
PERCENT OF RECOVERY TIME @ 50.0 PERCENT =	0.376
TOTAL RECOVERY TIME =	0.671

INITIAL POSITION OF THE MOTOR LINE IS 30.0 SECONDS
THE LOAD IS TAKEN OFF AS FOLLOWS FOLLOWING
LOAD KW / FCU UNIT RATING

EXISTING SPEED	2012.
APPLIED MOTORS	87.
NET LOAD	2106.
MOTOR SPEED	2.95

THE ACCUMULATED RESISTIVE LOAD IS	246 KW
THE ACCUMULATED STATIC INERTIA IS	40760. LB-FT-SQRD
C _P = 0.6636691343	

THE THRUST POWER FOR THE MOTORS AT THIS STEP IS 536. SWVA
THE TOTAL MOTOR VOLTAGE DIP = 5.81%

TIME OF RECOVERY TIME TO 99.0 PERCENT =	0.003
INITIAL RECOVERY TIME =	0.002

MOTOR NUMBER 1 HAVING ROTATING = 105, IP @ 1775 RPM.
THE MOTOR HAS 1775 RPM.
TOTAL LOAD TORQUE IS 15.371. THE TOTAL INERTIA AND WILL HAVE A 65. KW LOAD WHEN DURING
1.065. FLAG 1 = 0, FLAG 2 = 0, FLAG 3 = 1.

INPUTS - PERCENT

AVERAGE

OUTPUT

ELEMENT FORCED, ELEMENT INCORRECT, INCORRECT

TIME AV. SPEED

LOAD MOTOR

LOAD

ROT OF

ROT OF

TIME

LOAD

60126010 FREQUENCY AND VOLTAGE DROOP & L. S/Z 205575, 42 OP, 2350 KW @ 90% RPM, HCLR LOADS, UNIT 1

APPENDIX B2

TIME	INCREMENTAL LOAD-KW	CHANGE IN DEVIATION	NET DEVIATION	NET LOAD-KW	AVAILABLE LOAD-KW
0.10	243.89	0.0741	0.0741	2366.99	0.0 0.
0.20	217.02	0.05227	0.12638	2236.02	0.0 0.
0.30	198.89	0.05766	0.19074	2217.99	0.0 0.
0.40	183.62	0.05268	0.24343	2202.62	0.0 0.
0.50	172.47	0.04748	0.29091	2191.47	0.0 0.
0.58	167.25	0.03662	0.32259	2186.22	0.0 0.
0.62	162.02	0.03622	0.32281	2186.22	0.0 0.
DEVIATION AT INFLECTION = 0.356					
DEVIATION AT LINE = 0.216					
INITIAL DEVIATION = 0.336					
PERCENT DEVIATION AT 98.0 PERCENT = 0.576					
TOTAL RECOVERY TIME = 0.696					
STEP NO. 3 THE STARTING TIME IS 70.00 SECONDS					
THE GAPS ARE FOLLOWING					
LOADS IN HCLR UNIT RATING					
EXISTING = 268.4					
ADDED = 0.					
REMOVED = 21.2					
TOTAL = 247.2					
THE ACCUMULATED PESTIVE LOAD IS 246.1 KW, I.E. 1.63 PERCENT RATING					
THE AVAILABLE THRUST POWER FOR THIS MOTORS AT THIS STEP IS 308. KW					
VOLTAGE DIP = 4.63%					
PERCENT OF MAXIMUM VOLTAGE DIP = 0.015					
TOTAL THRUST POWER = 0.63%					
0.605 KW / 0.63% = 0.942					

A326610. EFFICIENCY AND VOLTAGE EXCITATION PREDICTIONS CRFED PAGE 45

MOTOR NUMBER 1 MOTOR RATING = 50. HP AT 1800 RPM.
FULL LOAD TORQUE IS 146. LB-FT.
FULL LOAD KM IS 31. AT 0.41452 PER ASSUMED EFFICIENCY OF 29 PERCENT.

INPUT TIME = 0.0 KW = 0.0	TIME = 0.1000, INCREMENTAL KW LOAD = 50.0
	TIME = 0.2000, INCREMENTAL KW LOAD = 50.0
	TIME = 0.3000, INCREMENTAL KW LOAD = 50.0
	TIME = 0.4000, INCREMENTAL KW LOAD = 50.0
INPUT TIME = 0.5000, KW = 50.0	TIME = 0.5000, INCREMENTAL KW LOAD = 50.0
	TIME = 0.6000, INCREMENTAL KW LOAD = 51.0
	TIME = 0.7000, INCREMENTAL KW LOAD = 52.0
	TIME = 0.8000, INCREMENTAL KW LOAD = 53.0
	TIME = 0.9000, INCREMENTAL KW LOAD = 53.0
INPUT TIME = 1.0000, KW = 54.0	TIME = 1.0000, INCREMENTAL KW LOAD = 54.0
	TIME = 1.1000, INCREMENTAL KW LOAD = 55.0
	TIME = 1.2000, INCREMENTAL KW LOAD = 55.0
	TIME = 1.3000, INCREMENTAL KW LOAD = 55.0
INPUT TIME = 1.4000, KW = 56.0	TIME = 1.4000, INCREMENTAL KW LOAD = 56.0
INPUT TIME = 1.5000, KW = 56.0	TIME = 1.5000, INCREMENTAL KW LOAD = 56.0
INPUT TIME = 1.6000, KW = 57.0	TIME = 1.6000, INCREMENTAL KW LOAD = 57.0
INPUT TIME = 1.7000, KW = 57.0	TIME = 1.7000, INCREMENTAL KW LOAD = 57.0
INPUT TIME = 1.8000, KW = 58.0	TIME = 1.8000, INCREMENTAL KW LOAD = 58.0
INPUT TIME = 1.9000, KW = 58.0	TIME = 1.9000, INCREMENTAL KW LOAD = 58.0
INPUT TIME = 2.0000, KW = 59.0	TIME = 2.0000, INCREMENTAL KW LOAD = 59.0
INPUT LOAD VOLTAGE AT 2.0000	INPUT LOAD VOLTAGE AT 2.0000

LOSS LOAD EQUALS 12A AND INCLINES AT 120°
OVERVOLTAGE OCCURS AT 2.0 WITH RECOVERY AT 2.1°

TIME INCREMENTAL LOAD-KW	CHARGE IN DEVIATION	NET DEVIATION	NET LOAD-KW	AVAILABLE LOAD-KW
0.40	49.73	0.01424	0.01424	0.0 0 0
0.50	49.73	0.01424	0.02322	0.0 0 0
0.60	49.73	0.01424	0.04272	0.0 0 0
0.70	49.73	0.01424	0.05325	0.0 0 0
0.80	49.73	0.01424	0.07120	0.0 0 0
0.90	50.56	0.01424	0.09548	0.0 0 0
0.70	51.39	0.01471	0.10239	0.0 0 0
0.80	52.22	0.01452	0.14472	0.0 0 0
0.90	52.22	0.00731	0.16717	0.0 0 0

DEVIATION AT INJECTION =	0.445
MAXIMUM DEVIATION =	0.756
TIME OF RECOVERY TO 95.0 PERCENT =	0.0
TOTAL RECOVERY TIME =	0.332
INITIAL LOAD, THE SYSTEM TIME IS 10.00 SECONDS	
THE LOADS ARE AS FOLLOWS, TIME IS 10.00 SECONDS	
LOAD KW HP PERCENT RATING	
EXISTING 2425.0 0.6 74.83	
POWER 235.0 1.22 75.79	
THE ACCUMULATED PREDICTIVE LOAD IS 2463.46, LP-FIT 0.63 PERCENT RATING	
THE ACCUMULATED SYSTEM INERTIA IS 4163.16, FT-5000 = 0.6623597500	
THE THROUH POWER FOR THE MOTORS AT THIS STEP IS 280. SKVA AND THE CORRECTED THROUH POWER IS 280. SKVA	
VOLTAGE DIP = 1.531	
TIME OF MAXIMUM VOLTAGE DIP = 6.010	
PERCENT VOLTAGE TO 90.0 PERCENT = 0.6	
INITIAL INERTIA/LINE = 0.655 0.311	
MOTOR NUMBER 1 MOTOR RATING = 42. HP AT 1800 RPM	
THE MOTOR HAS 20.1 RELATIVE INERTIA AND WILL HAVE A 35. RPM AND INERTIA REDUCTION.	
INPUT LOAD = 600. KW	
FLAG 1 = 35. FLAG 2 = 35. FLAG 3 = 0.	
ASSUMED EFFICIENCY OF 90 PERCENT.	
INPUT - TIME = 0.0 KW = 42.	
TIME = 0.1000, INCREMENTAL KW LOAD = 42.	
TIME = 0.2000, INCREMENTAL KW LOAD = 42.	
TIME = 0.3000, INCREMENTAL KW LOAD = 42.	
TIME = 0.4000, INCREMENTAL KW LOAD = 42.	
TIME = 0.5000, INCREMENTAL KW LOAD = 42.	
TIME = 0.6000, INCREMENTAL KW LOAD = 42.	
TIME = 0.7000, INCREMENTAL KW LOAD = 42.	
TIME = 0.8000, INCREMENTAL KW LOAD = 42.	
TIME = 0.9000, INCREMENTAL KW LOAD = 42.	
TIME = 1.0000, INCREMENTAL KW LOAD = 42.	
INPUT - TIME = 0.2500, KW = 32.	
TIME = 0.3500, INCREMENTAL KW LOAD = 32.	
TIME = 0.4500, INCREMENTAL KW LOAD = 32.	
TIME = 0.5500, INCREMENTAL KW LOAD = 32.	
TIME = 0.6500, INCREMENTAL KW LOAD = 32.	
TIME = 0.7500, INCREMENTAL KW LOAD = 32.	
TIME = 0.8500, INCREMENTAL KW LOAD = 32.	
TIME = 0.9500, INCREMENTAL KW LOAD = 32.	
TIME = 1.0500, INCREMENTAL KW LOAD = 32.	
INPUT - TIME = 1.5000, KW = 55.	
TIME = 1.6000, INCREMENTAL KW LOAD = 55.	
TIME = 1.7000, INCREMENTAL KW LOAD = 55.	
TIME = 1.8000, INCREMENTAL KW LOAD = 55.	
TIME = 1.9000, INCREMENTAL KW LOAD = 55.	
TIME = 2.0000, INCREMENTAL KW LOAD = 55.	
INPUT - TIME = 1.7000, KW = 70.	
TIME = 1.8000, INCREMENTAL KW LOAD = 70.	
TIME = 1.9000, INCREMENTAL KW LOAD = 70.	
TIME = 2.0000, INCREMENTAL KW LOAD = 70.	
INPUT - TIME = 1.8000, KW = 87.	
TIME = 1.9000, INCREMENTAL KW LOAD = 87.	
TIME = 2.0000, INCREMENTAL KW LOAD = 87.	
INPUT - TIME = 2.0000, KW = 35.	
TIME = 2.0000, INCREMENTAL KW LOAD = 35.	

FROM LOAD = $B7$, AT 1,000 SECONDS
WITH PEAK VOLTAGE AT 2,1600

FROM LOAD = $C7$, AND OCCURS AT 2,1600 WITH RECOVERY AT 2,160

TIME	INCREMENTAL LOAD-KW	CHANGE IN DEVIATION	NET DEVIATION	NET LOAD-KW	AVAILABLE LOAD-KW
0.40	41.78	0.01195	0.01195	2166.78	0.0 0 0
0.50	41.78	0.01195	0.03584	2166.78	0.0 0 0
0.40	41.78	0.01195	0.04779	2166.78	0.0 0 0
0.50	41.78	0.01195	0.05973	2166.78	0.0 0 0
0.60	42.47	0.01245	0.07168	2167.47	0.0 0 0
0.70	43.17	0.01235	0.08423	2168.47	0.0 0 0
0.80	43.86	0.01254	0.09677	2169.86	0.0 0 0
0.88	44.56	0.01600	0.10671	2169.56	2169.56
0.92	44.23	-0.07034	0.03621	2169.56	2169.56

DEVIATION AT INFLECTION = 0.167

MAXIMUM LOAD-KW = 0.820

MAXIMUM DEVIATION = 0.107

TIME OF RECOVERY TO 98.0 PERCENT = 0.078

TOTAL RECOVERY TIME = 0.214

STEP POSITION THE STARTING TIME IS 90.60 SECONDS
THE LOADS ARE AS FOLLOWS:

LOAD-KW LINE-FCU_WHT_EATING

EXISTING = 1641

EXISTING = 79.32

CHARGE = 60.0

CHARGE = 15.0

HT LOAP = 35.5

HT LOAP = 15.27

HT LOAP = 26.67

HT LOAP = 9.426

THE ACCUMULATED RESISTIVE LOAD IS 246.0 KW.

LINE-ACCUMLATED SYSTEM INERTIA IS 2153.4 LB-EL-SEC-QD = 0.0232224

THE THROUGH POWER FOR THE MOTORS AT THIS STEP IS 3732. SEVA GUP THE THROUGH POWER IS 3732. SEVA

VOLTAGE DIP = 16.768

TIME OF MAXIMUM VOLTAGE DIP = 0.165

RECOVERY TIME IN SEC. = 0.500

TOTAL RECOVERY TIME = 0.351

MOTOR HANLDE A MOTORS LOAD = 0.118

THE MOTOR HAS 25% LOAD-SHARING

THE MOTOR HAS 100% LOAD-SHARING

FULL LOAD TORQUE IS 1553. LB-FT

FULL LOAD KW IS 526.67

ASSUMED EFFICIENCY OF 90 PERCENT

FLAG 1 = 0 FLAG 2 = 0 FLAG 3 = 0

INPUT-TIME = 0.0 , KW = 632.

LINNE = 0.1000, INCREMENTAL KW LOAD = 632.

PERIODICITY AND VOLATILITY PREDICTION PROJECT
AFKARAS F&L, S/O 265525, 12 OF, 2950 FM 506 FHM, KAR LINNS, MTR

TEST NO. 2. THE STARTING TIME IS 120.00 SECONDS.
THE LOADS ARE AS FOLLOWS:

Ergonomics in Design 11(1)

VOLTAGE DIP = MAXIMUM VOLTAGE DIP -
LINE OF MINIMUM VOLTAGE DIP = 0.080

RECOVERY TIME TO 95.0 PERCENT = 0.0
TOTAL RECOVERY LINE = 0.023

STATOR NUMBER 1 MOTOR RATING = 0.7 KW. 61 RPM.
THE MOTOR HAS 100 LINES AND WILL HAVE A
NO LOAD WHEN TURNING.

FUEL LOAD KW IS 283, LB ASSUMED EFFICIENCY OF 70 PERCENT.
FUEL LOAD KW IS 283, LB ASSUMED EFFICIENCY OF 70 PERCENT.
FLAG 1 = 0, FLAG 2 = 2, FLAG 3 = 0.

INITIAL TIME = 0.5000; KM = 26.0000; TIME = 0.5000; INITIAL KM = 0.0000

INITIAL TIME = 1,000, KU = 105, TIME = 1,000, KU = 105, TIME = 1,000, KU = 105, TIME = 1,000, KU = 105.

LUMI-LINE = 1,5000, ED = 129, TIME = 1,6000, INDEFINITE LOAD = 145, INDEFINITE LOAD = 161;

TIME = 4,0000...IMPERCETTABILE... 261

TIME = 2.0000, INCIDENCE ANGLE = 30.

TIME	INCREMENTAL LOAD-KW	CHANGE IN DEVIATION	NET DEVIATION	NET LOAD KW	AVAILABLE LOAD KW
0.00	0.00	0.00	0.00	0.00	1000.00
0.05	100.00	100.00	100.00	900.00	1000.00
0.10	100.00	100.00	100.00	800.00	1000.00
0.15	100.00	100.00	100.00	700.00	1000.00
0.20	100.00	100.00	100.00	600.00	1000.00
0.25	100.00	100.00	100.00	500.00	1000.00
0.30	100.00	100.00	100.00	400.00	1000.00
0.35	100.00	100.00	100.00	300.00	1000.00
0.40	100.00	100.00	100.00	200.00	1000.00
0.45	100.00	100.00	100.00	100.00	1000.00
0.50	100.00	100.00	100.00	0.00	1000.00
0.55	100.00	100.00	100.00	-100.00	1000.00
0.60	100.00	100.00	100.00	-200.00	1000.00
0.65	100.00	100.00	100.00	-300.00	1000.00
0.70	100.00	100.00	100.00	-400.00	1000.00
0.75	100.00	100.00	100.00	-500.00	1000.00
0.80	100.00	100.00	100.00	-600.00	1000.00
0.85	100.00	100.00	100.00	-700.00	1000.00
0.90	100.00	100.00	100.00	-800.00	1000.00
0.95	100.00	100.00	100.00	-900.00	1000.00
1.00	100.00	100.00	100.00	-1000.00	1000.00

0.10 26.40 0.02254 0.02752 2721.45 6.3...0
0.20 26.40 0.02754 0.03561 2721.45 0.0 0.
0.30 26.40 0.03561 0.04561 2721.45 0.0 0.

THE JOURNAL OF CLIMATE

TEST NO. 6 FREQUENCY AND VIBRATION EXCITATION TEST REPORT DATE: 10/10/66
MANUFACTURER: L. S. T. CO. INC. 1205 W. 12TH ST., KANSAS CITY, MO.
TEST NO. 10114

0.39	93.40	0.72754	0.08252	2724.48	0.0	0.
0.40	96.40	0.02754	0.41017	2721.48	0.0	0.
0.50	96.40	0.02754	0.15071	2721.48	0.0	0.
0.59	98.07	0.02634	0.14400	2721.02	0.0	0.
0.70	98.02	-0.01162	0.4576	2721.02	0.0	0.

DEFLECTION AT INFLECTION = 0.164

DEFLECTION AT DEAD LOAD = 0.521

MAXIMUM DEVIATION = 0.184

TIME OF MAXIMUM DEVIATION = 0.594

TIME OF RECOVERY TO 98.0 PERCENT = 0.677

INITIAL DEFLECTION LINE =

AN325010 FREQUENCY AND VOLTAGE EXCURSION PREDICTION FREQUENCY PAGE 1
REFERENCES P & L, S/O 205225, V2 OF, 2853 KW @ 963 RPM, LOOP LOADS, UNIT 1

FREQUENCY RATED AT 2050.0 RPM AT 700.0 KW AT 12% CYLINDER-SQUARED INERTIA WITH CAPABILITY OF 126.0 PERCENT LOAD, AND WITH 3452, 1.6-F SQUARED INERTIA

GENERATOR RATED AT 4063. KVA AND HAS THE FOLLOWING PROPERTIES:

SUSPENDED REACTANCE 12.46 PERCENT

FULL LOAD FIELD VOLTAGE 2.00 VOLTS

MAXIMUM FIELD VOLTAGE = FORCING 3.5 VOLTS

THE CORRECTED SUB-TRANSIENT REACTANCE IS 21.933 PERCENT

THE POINT FOR INITIATION OF RECOVERY FOR VOLTAGE IS 90. PERCENT AND FOR FREQUENCY IS 98. FREQUENCY

THE FOLLOWING CONSTANTS ARE BEING USED FOR THESE COMPUTATIONS:

GENERATOR DUE CONSTANT 1.667

GENERATOR RECOVERY RATE 1.500

EXISTING LOAD COEFFICIENT 0.450

EXISTING LOAD COEFFICIENT 0.510

EXISTING LOAD COEFFICIENT 0.550

LOAD RECOVERY RATE 0.250 PER SECOND

THIRD ORDER LOAD COEFFICIENT 0.000

VOLTAGE INCREMENTAL CONSTANT IS 0.60

FLAG 20 SET 0.2

KNACK LOAD LINE CONSTANT IS 0.0220

CORRECTED LOAD FACTOR 0.350

PERCENTAGE LOAD RATIO = 6.1500

ACCELERATION CONSTANT (AC2) = 0.0034200165

LINELINE LOAD LINE = 0.3733224336

THE POINT AT THE SPREADING LINE IS 6.0 SECONDS
THE LOAD LINE AT THE SPREADING LINE IS 6.0 SECONDS

LOAD LINE RATED POWER DUE TO INITIATING

EXISTING 0.0

ABOVE 2.49*

DEBT LOAD 0.01

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TABLE 64320010 FREQUENCY AND VOLTAGE EXCURSION PREDICTION PROGRAM PAGE 2 UNIT 1

1	INPUT TIME = 1.0000, KW = 87.	TIME = 0.6000, INCREMENTAL KW 1.000 = 62.
2	TIME = 0.7000, INCREMENTAL KW 1.000 = 63.	
3	TIME = 0.8000, INCREMENTAL KW 1.000 = 65.	
4	TIME = 0.9000, INCREMENTAL KW 1.000 = 66.	
5	TIME = 1.0000, INCREMENTAL KW 1.000 = 67.	
6	INPUT TIME = 1.5000, KW = 167.	TIME = 1.1000, INCREMENTAL KW 1.000 = 91.
7	INPUT TIME = 1.7000, KW = 134.	TIME = 1.2000, INCREMENTAL KW 1.000 = 25.
8	INPUT TIME = 1.8000, KW = 168.	TIME = 1.3000, INCREMENTAL KW 1.000 = 99.
9	INPUT TIME = 1.9000, KW = 160.	TIME = 1.4000, INCREMENTAL KW 1.000 = 103.
10	INPUT TIME = 2.0000, KW = 168.	TIME = 1.5000, INCREMENTAL KW 1.000 = 107.
11	PEAK LOAD = 168. AT 1.9000 SECONDS. WITH PEAK VOLTAGE AT 2.1600	TIME = 1.6000, INCREMENTAL KW 1.000 = 121.
12	INPUT TIME = 2.1000 WITH RECOVERY AT 2.79	TIME = 1.7000, INCREMENTAL KW 1.000 = 134.
13	PEAK LOAD KW = 168. AND OCCURS AT 2.10 WITH RECOVERY AT 2.79	INPUT TIME = 2.0000, INCREMENTAL KW 1.000 = 138.
14	INPUT INCREMENTAL KW = 0.10	CHARGE IN DEVIATION = 0.44403
15	INPUT INCREMENTAL KW = 0.20	CHARGE IN DEVIATION = 0.44403
16	INPUT INCREMENTAL KW = 0.30	CHARGE IN DEVIATION = 0.44403
17	INPUT INCREMENTAL KW = 0.40	CHARGE IN DEVIATION = 0.44403
18	INPUT INCREMENTAL KW = 0.50	CHARGE IN DEVIATION = 0.44403
19	INPUT INCREMENTAL KW = 0.60	CHARGE IN DEVIATION = 0.44403
20	INPUT INCREMENTAL KW = 0.70	CHARGE IN DEVIATION = 0.44403
21	INPUT INCREMENTAL KW = 0.80	CHARGE IN DEVIATION = 0.44403
22	INPUT INCREMENTAL KW = 0.90	CHARGE IN DEVIATION = 0.44403
23	INPUT INCREMENTAL KW = 1.00	CHARGE IN DEVIATION = 0.44403
24	INPUT INCREMENTAL KW = 1.10	CHARGE IN DEVIATION = 0.44403
25	INPUT INCREMENTAL KW = 1.20	CHARGE IN DEVIATION = 0.44403
26	DEVIATION AT INFLECTION = 0.454	MAXIMUM DEVIATION = 0.504
27	LINE OF MAXIMUM DEVIATION = 0.454	LINE OF RECOVERY TO 96.0 PERCENT = 0.0
28	TOTAL RECOVERY TIME = 1.297	

STEP NO. 2 THE STARTING TIME IS 4.50 SECONDS

THE LOADS ARE AS FOLLOWS:
LOAD KW PER UNIT RATING

STARTING TORQUE	10.75
ROTOR KW	66.3
TOTAL LOAD KW	97.6

THE ACCUMULATED RESISTIVE LOAD IS 346.63 KW, LB-FT. SQRD = C2P = 0.0033853479
THE ACCUMULATED SYSTEM INERTIA IS 34722.1 LB-FT. SQRD = 8.63 PERCENT RATING

THE PRESENT POWER FOR THE MOTORS AT THIS STEP IS 4924.2 KW AND THE COERCED THROUH POWER IS 4924.2 KW

VOLTAGE DIP = 20.709
VOLTAGE RECOVERY TIME TO 90.0 PERCENT = 0.331
ACCELERATION TIME = 0.322

MOTOR NUMBER 1 MOTOR RATING = 300 KW AT 365 RPM.
THE MOTOR HAS A FULL LOAD TORQUE OF 5000 LB-FT.
THE LOAD TORQUE IS 3700.4 LB-FT.
FULL LOAD KW IS 66.3. 61.0% ASSISTED EFFICIENCY OF 90 PERCENT.
FLAG 1 = 0, FLAG 2 = 0, FLAG 3 = 0.

INPUTS PERCENT

AVERAGE OUTPUT

ELECTRICAL CURRENT

AV. TERM MOTOR SPEED

PERCENT KVA LOAD

VOLTS

AMPS

PERCENT

KVA LOAD

PERCENT

CHARGE

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TABLE 6. FREQUENCY AND VOLTAGE TRANSITION PREDICTION RESULTS FOR LOADS, UNIT 1

	65.00	40.00	40.00	100.00	37.50	2.20	160.00	190.00	67.00	2.24	50.00	86.00
	-	-	-	-	2.30	-	100.00	100.00	62.50	-	2.07	50.60
	-	-	-	-	2.40	-	100.00	100.00	62.50	-	2.07	52.75
	-	-	-	-	2.50	-	100.00	100.00	62.50	-	2.07	54.90
	-	-	-	-	2.60	-	100.00	100.00	62.50	-	2.07	57.05
	-	-	-	-	2.70	-	100.00	100.00	62.50	-	2.07	59.20
	-	-	-	-	2.80	-	100.00	100.00	62.50	-	2.07	61.35
	-	-	-	-	2.90	-	100.00	100.00	62.50	-	2.07	63.50
	-	-	-	-	3.00	-	100.00	100.00	62.50	-	2.07	65.65
	-	-	-	-	3.10	-	100.00	100.00	62.50	-	2.07	67.80
	-	-	-	-	3.20	-	100.00	100.00	62.50	-	2.07	69.95
	-	-	-	-	3.30	-	100.00	100.00	62.50	-	2.07	72.10
	-	-	-	-	3.40	-	100.00	100.00	62.50	-	2.07	74.25
	-	-	-	-	3.50	-	100.00	100.00	62.50	-	2.07	76.40
	-	-	-	-	3.60	-	100.00	100.00	62.50	-	2.07	78.55
	-	-	-	-	3.70	-	100.00	100.00	62.50	-	2.07	80.70
	-	-	-	-	3.80	-	100.00	100.00	62.50	-	2.07	82.85
	-	-	-	-	3.90	-	100.00	100.00	62.50	-	2.07	85.00
	-	-	-	-	4.00	-	100.00	100.00	62.50	-	2.07	87.15
	-	-	-	-	4.10	-	100.00	100.00	62.50	-	2.07	89.30
	-	-	-	-	4.20	-	100.00	100.00	62.50	-	2.07	91.45
	-	-	-	-	4.30	-	100.00	100.00	62.50	-	2.07	93.60
	-	-	-	-	4.40	-	100.00	100.00	62.50	-	2.07	95.75
	-	-	-	-	4.50	-	100.00	100.00	62.50	-	2.07	97.90
	-	-	-	-	4.60	-	100.00	100.00	62.50	-	2.07	99.95
	-	-	-	-	4.70	-	100.00	100.00	62.50	-	2.07	102.10
	-	-	-	-	4.80	-	100.00	100.00	62.50	-	2.07	104.25
	-	-	-	-	4.90	-	100.00	100.00	62.50	-	2.07	106.40
	-	-	-	-	5.00	-	100.00	100.00	62.50	-	2.07	108.55
	-	-	-	-	5.10	-	100.00	100.00	62.50	-	2.07	110.70
	-	-	-	-	5.20	-	100.00	100.00	62.50	-	2.07	112.85
	-	-	-	-	5.30	-	100.00	100.00	62.50	-	2.07	115.00
	-	-	-	-	5.40	-	100.00	100.00	62.50	-	2.07	117.15
	-	-	-	-	5.50	-	100.00	100.00	62.50	-	2.07	119.30
	-	-	-	-	5.60	-	100.00	100.00	62.50	-	2.07	121.45
	-	-	-	-	5.70	-	100.00	100.00	62.50	-	2.07	123.60
	-	-	-	-	5.80	-	100.00	100.00	62.50	-	2.07	125.75
	-	-	-	-	5.90	-	100.00	100.00	62.50	-	2.07	127.90
	-	-	-	-	6.00	-	100.00	100.00	62.50	-	2.07	129.95
	-	-	-	-	6.10	-	100.00	100.00	62.50	-	2.07	132.10
	-	-	-	-	6.20	-	100.00	100.00	62.50	-	2.07	134.25
	-	-	-	-	6.30	-	100.00	100.00	62.50	-	2.07	136.40
	-	-	-	-	6.40	-	100.00	100.00	62.50	-	2.07	138.55
	-	-	-	-	6.50	-	100.00	100.00	62.50	-	2.07	140.70
	-	-	-	-	6.60	-	100.00	100.00	62.50	-	2.07	142.85
	-	-	-	-	6.70	-	100.00	100.00	62.50	-	2.07	145.00
	-	-	-	-	6.80	-	100.00	100.00	62.50	-	2.07	147.15
	-	-	-	-	6.90	-	100.00	100.00	62.50	-	2.07	149.30
	-	-	-	-	7.00	-	100.00	100.00	62.50	-	2.07	151.45
	-	-	-	-	7.10	-	100.00	100.00	62.50	-	2.07	153.60
	-	-	-	-	7.20	-	100.00	100.00	62.50	-	2.07	155.75
	-	-	-	-	7.30	-	100.00	100.00	62.50	-	2.07	157.90
	-	-	-	-	7.40	-	100.00	100.00	62.50	-	2.07	159.95
	-	-	-	-	7.50	-	100.00	100.00	62.50	-	2.07	162.10
	-	-	-	-	7.60	-	100.00	100.00	62.50	-	2.07	164.25
	-	-	-	-	7.70	-	100.00	100.00	62.50	-	2.07	166.40
	-	-	-	-	7.80	-	100.00	100.00	62.50	-	2.07	168.55
	-	-	-	-	7.90	-	100.00	100.00	62.50	-	2.07	170.70
	-	-	-	-	8.00	-	100.00	100.00	62.50	-	2.07	172.85
	-	-	-	-	8.10	-	100.00	100.00	62.50	-	2.07	175.00
	-	-	-	-	8.20	-	100.00	100.00	62.50	-	2.07	177.15
	-	-	-	-	8.30	-	100.00	100.00	62.50	-	2.07	179.30
	-	-	-	-	8.40	-	100.00	100.00	62.50	-	2.07	181.45
	-	-	-	-	8.50	-	100.00	100.00	62.50	-	2.07	183.60
	-	-	-	-	8.60	-	100.00	100.00	62.50	-	2.07	185.75
	-	-	-	-	8.70	-	100.00	100.00	62.50	-	2.07	187.90
	-	-	-	-	8.80	-	100.00	100.00	62.50	-	2.07	190.05
	-	-	-	-	8.90	-	100.00	100.00	62.50	-	2.07	192.20
	-	-	-	-	9.00	-	100.00	100.00	62.50	-	2.07	194.35
	-	-	-	-	9.10	-	100.00	100.00	62.50	-	2.07	196.50
	-	-	-	-	9.20	-	100.00	100.00	62.50	-	2.07	198.65
	-	-	-	-	9.30	-	100.00	100.00	62.50	-	2.07	200.80
	-	-	-	-	9.40	-	100.00	100.00	62.50	-	2.07	202.95
	-	-	-	-	9.50	-	100.00	100.00	62.50	-	2.07	205.10
	-	-	-	-	9.60	-	100.00	100.00	62.50	-	2.07	207.25
	-	-	-	-	9.70	-	100.00	100.00	62.50	-	2.07	209.40
	-	-	-	-	9.80	-	100.00	100.00	62.50	-	2.07	211.55
	-	-	-	-	9.90	-	100.00	100.00	62.50	-	2.07	213.70
	-	-	-	-	10.00	-	100.00	100.00	62.50	-	2.07	215.85
	-	-	-	-	10.10	-	100.00	100.00	62.50	-	2.07	218.00
	-	-	-	-	10.20	-	100.00	100.00	62.50	-	2.07	220.15
	-	-	-	-	10.30	-	100.00	100.00	62.50	-	2.07	222.30
	-	-	-	-	10.40	-	100.00	100.00	62.50	-	2.07	224.45
	-	-	-	-	10.50	-	100.00	100.00	62.50	-	2.07	226.60
	-	-	-	-	10.60	-	100.00	100.00	62.50	-	2.07	228.75
	-	-	-	-	10.70	-	100.00	100.00	62.50	-	2.07	230.90
	-	-	-	-	10.80	-	100.00	100.00	62.50	-	2.07	233.05
	-	-	-	-	10.90	-	100.00	100.00	62.50	-	2.07	235.20
	-	-	-	-	11.00	-	100.00	100.00	62.50	-	2.07	237.35
	-	-	-	-	11.10	-	100.00	100.00	62.50	-	2.07	239.50
	-	-	-	-	11.20	-	100.00	100.00	62.50	-	2.07	241.65
	-	-	-	-	11.30	-	100.00	100.00	62.50	-	2.07	243.80
	-	-	-	-	11.40	-	100.00	100.00	62.50	-	2.07	245.95
	-	-	-	-	11.50	-	100.00	100.00	62.50	-	2.07	248.10
	-	-	-	-	11.60	-	100.00	100.00	62.50	-	2.07	250.25
	-	-	-	-	11.70	-	100.00	100.00	62.50	-	2.07	252.40
	-	-	-	-	11.80	-	100.00	100.00	62.50	-	2.07	254.55
	-	-	-	-	11.90	-	100.00	100.00	62.50	-	2.07	256.70
	-	-	-	-	12.00	-	100.00	100.00	62.50	-	2.07	258.85
	-	-	-	-	12.10	-	100.00	100.00	62.50	-	2.07	261.00
	-	-	-	-	12.20	-	100.00	100.00	62.50	-	2.07	263.15
	-	-	-	-	12.30	-	100.00	100.00	62.50	-	2.07	265.30
	-	-	-	-	12.40	-	100.00	100.00	62.50	-	2.07	267.45
	-	-	-	-	12.50	-	100.00	100.00	62.50	-	2.07	269.60
	-	-	-	-	12.60	-	100.00	100.00	62.50	-	2.07	271.75
	-	-	-	-	12.70	-	100.00	100.00	62.50	-	2.07	273.90
	-	-	-	-	12.80	-	100.00	100.00	62.50	-	2.07	276.05
	-	-	-	-	12.90	-	100.00	100.00	62.50	-	2.07	278.20
	-	-	-	-	13.00	-	100.00	100.00	62.50	-	2.07	

STEP NO. 3 THE STARTING TIME IS 15.05 SECONDS
THE LOADS ARE AS FOLLOWS:

LOAD KU HP-CT UNIT RATING

111.11 FT. 335.0
1000.00 MOTORS 314.
NET LOAD 132.037.51
6.9
14.54
17.35

THE ACCUMULATED RESISTIVE LOAD IS 39722.16-FT-SORD

-- C2P = 0.0029592476

THE THROTTLE POWER FOR THE MOTORS AT THIS STEP IS 295.1. SEAS AND THE CORRECTED THROTTLE POWER IS 295.1. SEAS

VOLTAGE DIP = 13.753

TIME OF MAXIMUM VOLTAGE DIP = 0.986

RECOVERY TIME TO 90.0 PERCENT = 0.154

TOTAL RECOVERY TIME = 0.335

0.642

MOTOR NUMBER 1 MOTOR RATING = 500. HP 61.1736. KWT HAVE A 322. KG LENGTH AND RUNNING

THE MOTOR HAS 332.15-FT SQUARED INERTIA. GEAR RATIO IS 1.475.

FULL LOAD TORQUE IS 41.4. AT 60 ASSUMED EFFICIENCY OF 90 PERCENT.

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NO. 320010 FREQUENCY AND VOLTAGE EXCURSION PREDICTIONS 1000 KW, Part 4
MACHINES P & L, S/O 205925, 12 OF, 2850 KW @ 900 KID, 1,000 LOADS, UNIT 4

TOTAL EQUIVALENT ENERGY = 587.97681
DEGREE OF SEVERITY = 165.9980
PEAK MOTION LOAD = 90.2 OF 9000 LOADS

PEAK LOAD % = 96.3 AND OCCURS AT 1.30 WITH RECOVERY AT 2.07

TIME	INCREMENTAL LOAD-KW	CHANGE IN DEVIATION	NET DEVIATION	NET LOAD-KW	AVAILABLE LOAD-KW
- 0.40	- 526.92	- 0.47564	- 0.47564	- 1534.93	- 1534.93
0.20	582.54	0.17239	0.34903	1517.54	1517.54
0.30	664.36	0.49571	0.84426	1592.36	1592.36
0.40	679.06	0.26095	0.74574	1614.06	1614.06
0.50	684.95	0.03429	0.78019	1619.05	1619.05
0.60	695.51	- 0.10673	0.67937	1630.51	1630.51
0.70	765.16	- 0.42856	0.41729	1700.16	2134.53 2.
0.80	902.80	- 0.16335	0.34394	1837.03	2487.43 2.
0.90	885.95	- 0.42373	0.17021	1820.95	2239.03 2.
1.00	767.51	- 0.17417	0.01663	1702.51	2251.02 2.

DEVIATION AT REFLECTION = 0.789

STATION DEVIATION = 0.417

ADDITIONAL DEVIATION = 0.789

TIME OF REFLECTION = 0.417

TIME OF RECOVERY TO 28.0 PERCENT = 0.0

TOTAL RECOVERY TIME = 1.007

THE PREDICTED FREQUENCY AT THE 1.30 SECONDS
THE 1.005 LOAD IS AS FOLLOWS:
HP. FOR 1000 LOAD KW UNIT RATING

EXISTING	1287	45.15
ADDED	0	0.0
MOTORS	87	105
BET. LOAD	1374	45.21

THE ACQUIRED RATED SYSTEM INERTIA IS 346.32, LF-FT-SQED = 0.01 = 0.502e363171

THE INRUSH POWER FOR TIE MOTORS AT THIS STEP IS 536. KW

VOLTAGE DIF = 2.812
TIME OF MAXIMUM VOLTAGE DIF = 0.018
RECOVERY TIME TO 90.0 PERCENT = 0.0

INITIAL RECOVERY TIME = 0.057	0.057
0.057	0.029

ROTATING MOTOR FREQUENCY 600 VOLT LINE, EXCITATION FREQUENCY 1100, AND LOAD 1000 VOLTS, UNIT 1

ROTATING MOTOR FREQUENCY 600 VOLT LINE, EXCITATION FREQUENCY 1100, AND LOAD 1000 VOLTS, UNIT 1
THE MOTOR HAS 85% INERTIA SQUARED, INERTIA AND UNIT HAVE A 65 KW LOAD WHEN RUNNING.
THE LOAD TORQUE IS 31.1 KG-F
THE LOAD POWER IS 87.0 KW
THE ASSUMED EFFICIENCY OF 90 PERCENT.

INERTIA PERCENT	OVERVOLTAGE	TIME	PERCENT CORRECTED	PERCENT INERTIA	ACCELERATION	DECELERATION
SPEED	MOTOR LOAD	TIME	NET TORQUE	NET TORQUE	NET SPEED	NET LOAD
0.0	220.00	0.0	220.00	0.0	0.0	0.0
2.00	232.00	0.01	232.00	0.01	0.06	0.0
4.00	237.00	0.10	234.50	0.22	0.22	0.0
6.00	246.00	0.34	241.50	0.57	0.49	0.0
8.00	255.00	0.66	241.50	0.57	0.39	0.0
10.00	257.00	1.56	262.00	1.18	0.25	0.0
12.00	261.00	2.75	273.00	2.13	0.25	0.0
14.00	265.00	4.95	282.00	3.18	0.25	0.0
16.00	271.00	7.14	292.00	4.18	0.25	0.0
18.00	277.00	9.34	302.00	5.18	0.25	0.0
20.00	283.00	11.53	312.00	6.18	0.25	0.0
22.00	289.00	13.72	322.00	7.18	0.25	0.0
24.00	295.00	15.91	332.00	8.18	0.25	0.0
26.00	301.00	18.10	342.00	9.18	0.25	0.0
28.00	307.00	20.29	352.00	10.18	0.25	0.0
30.00	313.00	22.48	362.00	11.18	0.25	0.0
32.00	319.00	24.67	372.00	12.18	0.25	0.0
34.00	325.00	26.86	382.00	13.18	0.25	0.0
36.00	331.00	29.05	392.00	14.18	0.25	0.0
38.00	337.00	31.24	402.00	15.18	0.25	0.0
40.00	343.00	33.43	412.00	16.18	0.25	0.0
42.00	349.00	35.62	422.00	17.18	0.25	0.0
44.00	355.00	37.81	432.00	18.18	0.25	0.0
46.00	361.00	39.99	442.00	19.18	0.25	0.0
48.00	367.00	42.18	452.00	20.18	0.25	0.0
50.00	373.00	44.37	462.00	21.18	0.25	0.0
52.00	379.00	46.56	472.00	22.18	0.25	0.0
54.00	385.00	48.75	482.00	23.18	0.25	0.0
56.00	391.00	50.94	492.00	24.18	0.25	0.0
58.00	397.00	53.12	502.00	25.18	0.25	0.0
60.00	403.00	55.31	512.00	26.18	0.25	0.0
62.00	409.00	57.50	522.00	27.18	0.25	0.0
64.00	415.00	59.69	532.00	28.18	0.25	0.0
66.00	421.00	61.88	542.00	29.18	0.25	0.0
68.00	427.00	64.07	552.00	30.18	0.25	0.0
70.00	433.00	66.26	562.00	31.18	0.25	0.0
72.00	439.00	68.45	572.00	32.18	0.25	0.0
74.00	445.00	70.64	582.00	33.18	0.25	0.0
76.00	451.00	72.83	592.00	34.18	0.25	0.0
78.00	457.00	75.02	602.00	35.18	0.25	0.0
80.00	463.00	77.21	612.00	36.18	0.25	0.0
82.00	469.00	79.40	622.00	37.18	0.25	0.0
84.00	475.00	81.59	632.00	38.18	0.25	0.0
86.00	481.00	83.78	642.00	39.18	0.25	0.0
88.00	487.00	85.97	652.00	40.18	0.25	0.0
90.00	493.00	88.16	662.00	41.18	0.25	0.0
92.00	499.00	90.35	672.00	42.18	0.25	0.0
94.00	505.00	92.54	682.00	43.18	0.25	0.0
96.00	511.00	94.73	692.00	44.18	0.25	0.0
98.00	517.00	96.92	702.00	45.18	0.25	0.0
100.00	523.00	99.11	712.00	46.18	0.25	0.0
102.00	529.00	101.30	722.00	47.18	0.25	0.0
104.00	535.00	103.49	732.00	48.18	0.25	0.0
106.00	541.00	105.68	742.00	49.18	0.25	0.0
108.00	547.00	107.87	752.00	50.18	0.25	0.0
110.00	553.00	109.06	762.00	51.18	0.25	0.0
112.00	559.00	111.25	772.00	52.18	0.25	0.0
114.00	565.00	113.44	782.00	53.18	0.25	0.0
116.00	571.00	115.63	792.00	54.18	0.25	0.0
118.00	577.00	117.82	802.00	55.18	0.25	0.0
120.00	583.00	119.01	812.00	56.18	0.25	0.0
122.00	589.00	121.20	822.00	57.18	0.25	0.0
124.00	595.00	123.39	832.00	58.18	0.25	0.0
126.00	601.00	125.58	842.00	59.18	0.25	0.0
128.00	607.00	127.77	852.00	60.18	0.25	0.0
130.00	613.00	129.96	862.00	61.18	0.25	0.0
132.00	619.00	132.15	872.00	62.18	0.25	0.0
134.00	625.00	134.34	882.00	63.18	0.25	0.0
136.00	631.00	136.53	892.00	64.18	0.25	0.0
138.00	637.00	138.72	902.00	65.18	0.25	0.0
140.00	643.00	140.91	912.00	66.18	0.25	0.0
142.00	649.00	143.10	922.00	67.18	0.25	0.0
144.00	655.00	145.29	932.00	68.18	0.25	0.0
146.00	661.00	147.48	942.00	69.18	0.25	0.0
148.00	667.00	149.67	952.00	70.18	0.25	0.0
150.00	673.00	151.86	962.00	71.18	0.25	0.0
152.00	679.00	154.05	972.00	72.18	0.25	0.0
154.00	685.00	156.24	982.00	73.18	0.25	0.0
156.00	691.00	158.43	992.00	74.18	0.25	0.0
158.00	697.00	160.62	1002.00	75.18	0.25	0.0
160.00	703.00	162.81	1012.00	76.18	0.25	0.0
162.00	709.00	165.00	1022.00	77.18	0.25	0.0
164.00	715.00	167.19	1032.00	78.18	0.25	0.0
166.00	721.00	169.38	1042.00	79.18	0.25	0.0
168.00	727.00	171.57	1052.00	80.18	0.25	0.0
170.00	733.00	173.76	1062.00	81.18	0.25	0.0
172.00	739.00	175.95	1072.00	82.18	0.25	0.0
174.00	745.00	178.14	1082.00	83.18	0.25	0.0
176.00	751.00	180.33	1092.00	84.18	0.25	0.0
178.00	757.00	182.52	1102.00	85.18	0.25	0.0
180.00	763.00	184.71	1112.00	86.18	0.25	0.0
182.00	769.00	186.90	1122.00	87.18	0.25	0.0
184.00	775.00	189.09	1132.00	88.18	0.25	0.0
186.00	781.00	191.28	1142.00	89.18	0.25	0.0
188.00	787.00	193.47	1152.00	90.18	0.25	0.0
190.00	793.00	195.66	1162.00	91.18	0.25	0.0
192.00	799.00	197.85	1172.00	92.18	0.25	0.0
194.00	805.00	200.04	1182.00	93.18	0.25	0.0
196.00	811.00	202.23	1192.00	94.18	0.25	0.0
198.00	817.00	204.42	1202.00	95.18	0.25	0.0
200.00	823.00	206.61	1212.00	96.18	0.25	0.0
202.00	829.00	208.80	1222.00	97.18	0.25	0.0
204.00	835.00	210.99	1232.00	98.18	0.25	0.0
206.00	841.00	213.18	1242.00	99.18	0.25	0.0
208.00	847.00	215.37	1252.00	100.18	0.25	0.0
210.00	853.00	217.56	1262.00	101.18	0.25	0.0
212.00	859.00	219.75	1272.00	102.18	0.25	0.0
214.00	865.00	221.94	1282.00	103.18	0.25	0.0
216.00	871.00	224.13	1292.00	104.18	0.25	0.0
218.00	877.00	226.32	1302.00	105.18	0.25	0.0
220.00	883.00	228.51	1312.00	106.18	0.25	0.0
222.00	889.00	230.70	1322.00	107.18	0.25	0.0
224.00	895.00	232.89	1332.00	108.18	0.25	0.0
226.00	901.00	235.08	1342.00	109.18	0.25	0.0
228.00	907.00	237.27	1352.00	110.18	0.25	0.0
230.00	913.00	239.46	1362.00	111.18	0.25	0.0
232.00	919.00	241.65	1372.00	112.18	0.25	0.0
234.00	925.00	243.84	1382.00	113.18	0.25	0.0
236.00	931.00	246.03	1392.00	114.18	0.25	0.0
238.00	937.00	248.22	1402.00	115.18	0.25	0.0
240.00	943.00	250.41	1412.00	116.18	0.25	0.0
242.00	949.00	252.60	1422.00	117.18	0.25	0.0
244.00	955.00	254.79	1432.00	118.18	0.25	0.0
246.00	961.00	256.98	1442.00	119.18	0.25	0.0
248.00	967.00	259.17	1452.00	120.18	0.25	0.0
250.00	973.00	261.36	1462.00	121.18	0.25	0.0
252.00	979.00	263.55	1472.00	122.18	0.25	0.0
254.00	985.00	265.74	1482.00	123.18	0.25	0.0
256.00	991.00	267.93	1492.00	124.18	0.25	0.0
258.00	997.00	270.12	1502.00	125.18	0.25	0.0
260.00	1003.00	272.31	1512.00	126.18	0.25	0.0
262.00	1009.00	274.50	1522.00	127.18	0.25	0.0
264.00	1015.00	276.69	1532.00	128.18	0.25	0.0
266.00	1021.00	278.88	1542.00	129.18	0.25	0.0
268.00	1027.00	281.07	1552.00	130.18	0.25	0.0
270.00	1033.00	283.26	1562.00	131.18	0.25	0.0
272.00	1039.00	285.45	1572.00	132.18	0.25	0.0
274.00	1045.00	287.64	1582.00	133.18	0.25	0.0
276.00	1051.00	289.83	1592.00	134.18	0.25	0.0
278.00	1057.00	292.02	1602.00	135.18	0.25	0.0
280.00	1063.00	294.21	1612.00	136.18	0.25	0.0
282.00	1069.00	296.40	1622.00	137.18	0.25	0.0

APPENDIX B3
FREQUENCY AND VOLTAGE EXCURSIONS PREDICTED PAGE 8
FOR 900 KW, 1200 KW & 2500 KW, 1200 KW, UNIT 4

DEVIATION AT INLECTION =	0.375
SYSTEM BEG TIME =	0.572
MAXIMUM DEVIATION =	0.572
TIME OF MAXIMUM DEVIATION =	0.672
TIME OF RECOVERY TO 90.0 PERCENT =	0.693
TOTAL RECOVERY TIME =	0.693

WELL LOAD THE STARTING TIME IS 0.55 SECONDS
THE LOAD ARE AS FOLLOWS FOR UNIT RATING
EXISTING 1352
ADDED 0.
ROTORS 3.05
WELL LOAD 1422

THE ACCUMULATED RELATIVE LOAD IS 1.846 KW. THE ACCUMULATED SYSTEM INERTIA IS 4617 KW-SQ-SEC. EQUATION OF MOTION = $\frac{d^2\theta}{dt^2} = \frac{0.002930695}{I}$
THE THRUSH POWER FOR THE MOTORS AT THIS STEP IS 536. KW AT THE CORR
SPD. THE MAXIMUM VOLTAGE DIP = 0.012
RECOVERY TIME 10.99.0 PERCENT = 0.018
TOTAL EDDY CURRENT = 0.052
0.059
0.020

MOTOR NUMBER 4 MOTOR RATING = 105. HP AT 1775 RPM
THE MOTOR HAS A SQUARED INERTIA AND WILL HAVE A 55% LOAD WHEN RUNNING.
INITIAL TORQUE 1.575. THE
LOAD IS 100 KW. 87% AT 60 ASSUMED EFFICIENCY OF 90 PERCENT.
FLAG 1 = 0, FLAG 2 = 0, FLAG 3 = 0.

INPUTS - PERCENT	AVERAGE			OUTPUT			INCREMENT			ACCUM. - INCREMENT		
	SPD	MOTOR	LOAD	MOTOR	LOAD	TIME	AV. TURB	MOTOR	NET	SPD	PERCENT	FW LOAD
0.0	250.00	250.00	0.0	250.00	0.0	0.00	0.00	0.00	0.00	0.0	0.0	0.00
5.0	245.00	245.00	0.01	245.00	0.01	0.00	0.00	0.00	0.00	0.0	0.0	0.00
10.0	240.00	240.00	0.02	240.00	0.02	0.00	0.00	0.00	0.00	0.0	0.0	0.00
15.0	235.00	235.00	0.03	235.00	0.03	0.00	0.00	0.00	0.00	0.0	0.0	0.00
20.0	230.00	230.00	0.04	230.00	0.04	0.00	0.00	0.00	0.00	0.0	0.0	0.00
25.0	225.00	225.00	0.05	225.00	0.05	0.00	0.00	0.00	0.00	0.0	0.0	0.00
30.0	220.00	220.00	0.06	220.00	0.06	0.00	0.00	0.00	0.00	0.0	0.0	0.00
35.0	215.00	215.00	0.07	215.00	0.07	0.00	0.00	0.00	0.00	0.0	0.0	0.00
40.0	210.00	210.00	0.08	210.00	0.08	0.00	0.00	0.00	0.00	0.0	0.0	0.00
45.0	205.00	205.00	0.09	205.00	0.09	0.00	0.00	0.00	0.00	0.0	0.0	0.00
50.0	200.00	200.00	0.10	200.00	0.10	0.00	0.00	0.00	0.00	0.0	0.0	0.00
55.0	195.00	195.00	0.11	195.00	0.11	0.00	0.00	0.00	0.00	0.0	0.0	0.00
60.0	190.00	190.00	0.12	190.00	0.12	0.00	0.00	0.00	0.00	0.0	0.0	0.00
65.0	185.00	185.00	0.13	185.00	0.13	0.00	0.00	0.00	0.00	0.0	0.0	0.00
70.0	180.00	180.00	0.14	180.00	0.14	0.00	0.00	0.00	0.00	0.0	0.0	0.00
75.0	175.00	175.00	0.15	175.00	0.15	0.00	0.00	0.00	0.00	0.0	0.0	0.00
80.0	170.00	170.00	0.16	170.00	0.16	0.00	0.00	0.00	0.00	0.0	0.0	0.00
85.0	165.00	165.00	0.17	165.00	0.17	0.00	0.00	0.00	0.00	0.0	0.0	0.00
90.0	160.00	160.00	0.18	160.00	0.18	0.00	0.00	0.00	0.00	0.0	0.0	0.00
95.0	155.00	155.00	0.19	155.00	0.19	0.00	0.00	0.00	0.00	0.0	0.0	0.00
100.0	150.00	150.00	0.20	150.00	0.20	0.00	0.00	0.00	0.00	0.0	0.0	0.00
105.0	145.00	145.00	0.21	145.00	0.21	0.00	0.00	0.00	0.00	0.0	0.0	0.00
110.0	140.00	140.00	0.22	140.00	0.22	0.00	0.00	0.00	0.00	0.0	0.0	0.00
115.0	135.00	135.00	0.23	135.00	0.23	0.00	0.00	0.00	0.00	0.0	0.0	0.00
120.0	130.00	130.00	0.24	130.00	0.24	0.00	0.00	0.00	0.00	0.0	0.0	0.00
125.0	125.00	125.00	0.25	125.00	0.25	0.00	0.00	0.00	0.00	0.0	0.0	0.00
130.0	120.00	120.00	0.26	120.00	0.26	0.00	0.00	0.00	0.00	0.0	0.0	0.00
135.0	115.00	115.00	0.27	115.00	0.27	0.00	0.00	0.00	0.00	0.0	0.0	0.00
140.0	110.00	110.00	0.28	110.00	0.28	0.00	0.00	0.00	0.00	0.0	0.0	0.00
145.0	105.00	105.00	0.29	105.00	0.29	0.00	0.00	0.00	0.00	0.0	0.0	0.00
150.0	100.00	100.00	0.30	100.00	0.30	0.00	0.00	0.00	0.00	0.0	0.0	0.00
155.0	95.00	95.00	0.31	95.00	0.31	0.00	0.00	0.00	0.00	0.0	0.0	0.00
160.0	90.00	90.00	0.32	90.00	0.32	0.00	0.00	0.00	0.00	0.0	0.0	0.00
165.0	85.00	85.00	0.33	85.00	0.33	0.00	0.00	0.00	0.00	0.0	0.0	0.00
170.0	80.00	80.00	0.34	80.00	0.34	0.00	0.00	0.00	0.00	0.0	0.0	0.00
175.0	75.00	75.00	0.35	75.00	0.35	0.00	0.00	0.00	0.00	0.0	0.0	0.00
180.0	70.00	70.00	0.36	70.00	0.36	0.00	0.00	0.00	0.00	0.0	0.0	0.00
185.0	65.00	65.00	0.37	65.00	0.37	0.00	0.00	0.00	0.00	0.0	0.0	0.00
190.0	60.00	60.00	0.38	60.00	0.38	0.00	0.00	0.00	0.00	0.0	0.0	0.00
195.0	55.00	55.00	0.39	55.00	0.39	0.00	0.00	0.00	0.00	0.0	0.0	0.00
200.0	50.00	50.00	0.40	50.00	0.40	0.00	0.00	0.00	0.00	0.0	0.0	0.00
205.0	45.00	45.00	0.41	45.00	0.41	0.00	0.00	0.00	0.00	0.0	0.0	0.00
210.0	40.00	40.00	0.42	40.00	0.42	0.00	0.00	0.00	0.00	0.0	0.0	0.00
215.0	35.00	35.00	0.43	35.00	0.43	0.00	0.00	0.00	0.00	0.0	0.0	0.00
220.0	30.00	30.00	0.44	30.00	0.44	0.00	0.00	0.00	0.00	0.0	0.0	0.00
225.0	25.00	25.00	0.45	25.00	0.45	0.00	0.00	0.00	0.00	0.0	0.0	0.00
230.0	20.00	20.00	0.46	20.00	0.46	0.00	0.00	0.00	0.00	0.0	0.0	0.00
235.0	15.00	15.00	0.47	15.00	0.47	0.00	0.00	0.00	0.00	0.0	0.0	0.00
240.0	10.00	10.00	0.48	10.00	0.48	0.00	0.00	0.00	0.00	0.0	0.0	0.00
245.0	5.00	5.00	0.49	5.00	0.49	0.00	0.00	0.00	0.00	0.0	0.0	0.00
250.0	0.00	0.00	0.50	0.00	0.50	0.00	0.00	0.00	0.00	0.0	0.0	0.00

APPENDIX B3
FREQUENCY AND VOLTAGE EXCURSIONS PREDICTED PAGE 9
FOR 900 KW, 1200 KW & 2500 KW, 1200 KW, UNIT 4

APPENDIX B3
FREQUENCY AND VOLTAGE EXCURSIONS PREDICTED PAGE 9
FOR 900 KW, 1200 KW & 2500 KW, 1200 KW, UNIT 4

APPENDIX B3
FLICKER AND VOLTAGE EXCURSION PREDICTION PROGRAM PAGE 9
MOTOR NO. 42 OF 205925, 1200 KW @ 500 RPM, 100% LOAD, PART 1

60.00	177.00	51.20	172.50	47.60	
65.00	193.00	61.40	165.00	56.31	
70.00	211.00	72.90	203.20	67.16	
75.00	213.00	85.74	203.00	72.32	
80.00	213.00	100.00	203.60	92.87	
85.00	213.00	100.00	203.60	100.00	
90.00	213.00	100.00	203.60	110.13	
95.00	213.00	100.00	203.60	110.13	
100.00	213.00	100.00	203.60	110.13	
				6.98	163.72
					174.

TOTAL EQUIVALENT ENERGY = 186.13477

PERCENT OF SEVERITY = 24.24% ^{at 0.166637 Cycles}

PEAK LOAD IN % = 242. AND OCCURS AT 0.10

SECONDS. EQUIVALENT DURATION = 1.76

TIME	INCREMENTAL LOAD-KW	CHANGE IN DEVIATION	NET DEVIATION	NET LOAD-KW	AVAILABLE LOAD-KW
0.10	348.39	0.97253	0.97253	1560.89	1560.89
0.20	247.02	0.06359	6.17652	1569.92	6.17652
0.30	193.09	0.05828	6.19479	1559.05	6.19479
0.40	183.62	0.05340	6.24852	1535.62	6.24852
0.50	172.47	0.05054	6.29913	1524.47	6.29913
0.57	167.22	0.05242	6.33655	1512.22	6.33655
0.60	122.35	-0.62312	6.26118	1512.22	6.26118

DEVIATION AT INFLECTION = 0.335

INCREMENTAL LOAD = 0.572

MAXIMUM DEVIATION = 0.335

TIME OF MAXIMUM DEVIATION = 0.572

TIME OF RECOVERY TO 98.0 PERCENT = 0.894

TOTAL RECOVERY TIME = 0.894

STEP NO. 5 THE STARTING TIME IS 70.00 SECONDS
THE LOADS ARE AS FOLLOWS:

LOAD-KW 1200 FCL WITH FAILING

EXISTING 1417.

ADDED 0.

NOT USED -49.

THE TOTAL LOAD = 1150.

50.00

THE ACCUMULATED RESISTIVE LOAD IS 2052 KW, NET 8.63 PERCENT PATH 1.
THE ACCUMULATED SUSCEPTIVE LOAD IS 2052 KW, NET 8.63 PERCENT PATH 2.

THE AMPLIFIED POWER FOR THE MOTORS AT THIS STEP IS 243. SKVA AND THE CORRECTED THRUST POWER IS 243. NVA

VOLTAGE DIP = 1.295

TIME OF MAXIMUM VOLTAGE DIP = 0.008

ECONOMY LOAD 20.0 PERCENT = 0.0

TOTAL RECOVERY TIME = 0.026

0.004 0.009

46329049 FREQUENCY AND VOLTAGE EXCUSION PREDICTION PROGRAM PAGE 4 OF UNIT 1

MOTOR NUMBER 1 MOTOR RATING = 40 KW AT 1000 RPM
 THE MOTOR HAS A FULL LOAD TORQUE OF 1.17 LB-FT SQUARED.
 FULL LOAD A.C. INPUT = 33 KW AT 40% DESIGNED EFFICIENCY DE-20 ELEMENT.

INPUT-TIME = 0.0 KW = 0	TIME = 0.1000, INCREMENTAL KW LOAD = 40				
	TIME = 0.2000, INCREMENTAL KW LOAD = 40				
	TIME = 0.3000, INCREMENTAL KW LOAD = 40				
	TIME = 0.4000, INCREMENTAL KW LOAD = 40				
	TIME = 0.5000, INCREMENTAL KW LOAD = 40				
INPUT-TIME = 0.5000, KW = 40	TIME = 0.6000, INCREMENTAL KW LOAD = 40				
	TIME = 0.7000, INCREMENTAL KW LOAD = 40				
	TIME = 0.8000, INCREMENTAL KW LOAD = 40				
	TIME = 0.9000, INCREMENTAL KW LOAD = 40				
	TIME = 1.0000, INCREMENTAL KW LOAD = 40				
INPUT-TIME = 1.0000, KW = 43	TIME = 1.1000, INCREMENTAL KW LOAD = 43				
	TIME = 1.2000, INCREMENTAL KW LOAD = 43				
	TIME = 1.3000, INCREMENTAL KW LOAD = 43				
	TIME = 1.4000, INCREMENTAL KW LOAD = 43				
	TIME = 1.5000, INCREMENTAL KW LOAD = 43				
INPUT-TIME = 1.5000, KW = 53	TIME = 1.6000, INCREMENTAL KW LOAD = 60				
INPUT-TIME = 1.7000, KW = 63	TIME = 1.8000, INCREMENTAL KW LOAD = 63				
INPUT-TIME = 1.8000, KW = 63	TIME = 1.9000, INCREMENTAL KW LOAD = 63				
INPUT-TIME = 1.9000, KW = 63	TIME = 2.0000, INCREMENTAL KW LOAD = 63				
INPUT-TIME = 2.0000, KW = 63	TIME = 2.1000, INCREMENTAL KW LOAD = 63				
INPUT-TIME = 2.1000, KW = 63	TIME = 2.17, INCREMENTAL KW LOAD = 63				
INPUT-TIME = 2.17, KW = 63	TIME = 2.17, OVERVOLTAGE OCCURS AT 2.10 WITH 4% RECOVERY AT 2.17				
INPUT-TIME, INCREMENTAL LOAD-KW, CHANGE IN DEVIATION, PCT. DEVIATION, NET LOAD-KW, AVAILABLE LOAD-KW					
0.10	39.79	0.01163	0.01163	4456.79	0.0 0 0
0.20	39.79	0.01163	0.02326	4456.79	0.0 0 0
0.30	39.79	0.01163	0.03490	4456.79	0.0 0 0
0.40	39.79	0.01163	0.04653	4456.79	0.0 0 0
0.50	39.79	0.01163	0.05817	4456.79	0.0 0 0
0.60	40.35	0.01183	0.06989	4452.45	0.0 0 0
0.70	41.44	0.01202	0.08294	4458.44	0.0 0 0
0.80	41.79	0.01221	0.09593	4452.73	0.0 0 0
0.89	42.44	0.01144	0.10564	4452.36 24	0.0 0 0
0.99	42.44	-0.02424	0.63443	4459.44	0.0 0 0

61525040 FREQUENCY AND VOLTAGE EXCITATION PREDICTION PROGRAM PAGE 44
OF KANSAS P&L, \$/0 26597.5, 12.01, 2350 KW P-700 P-0, 100% LOAD, UNIT A

DEVIATION AT INFLECTION =	0.406
SYSTEM DEAD TIME =	0.692
SYSTEM DEVIATION =	0.182
Total of prediction deviation =	0.182
Total of recovery to 95.0 PERCENT =	0.926
Total RECOVERY TIME =	0.926

STEP 105 - THE SYSTEM TIME-CONSTANT SETTOMS

The load is 100% of full load at 100% FCT UNIT RATING.

EXISTING = 4350, EXISTING = 50.63

GOODED = 0, GOODED = 0.9

PICTOR 2 = 34, PICTOR 2 = 37,

SET LOAD = 1.00, SET LOAD = 1.00

THE ACCUMULATED RESITIVE LOAD IS 295.0 KW, I-E-F-T = 0.63 PREDICTED PULLING

THE ACCUMULATED SYSTEM LOAD IS 403.02, I-E-F-T = 0.63 PREDICTED PULLING

C.F. = 0.929186455

THE TORQUE POWER FOR THE MOTORS AT THIS STEP IS 254. SKVA AND THE CORRECTED TORQUE POWER IS 254. SKVA

VOLTAGE DIP = 1.353

VOLTAGE OF 90.0 AND VOLTAGE DIP = 3.650

PERCENTAGE TIME TO 90.0 PERCENT = 0.0

TOTAL RECOVERY TIME = 0.027

0.004 = 0.010

MOTOR NUMBER 1 MOTOR RATING = 37. HP AT 4500 RPM

THE MOTOR HAS A TORQUE OF 100.100 N-M-SQURED-MILLIBLA AND MILLEJOE & = 31. KW LOAD WHEN RUNNING.

AT 100% LOAD, THE TORQUE IS 100.100 N-M-SQURED-MILLIBLA AND MILLEJOE & = 31. KW LOAD WHEN RUNNING.

FLAG 2 = 2, FLAG 3 = 0,

INPUT = TIME = 0.0 , KW = 37.

TIME = 0.1000, TIME = 0.1000, THE REACTOR KW LOAD = 37.

TIME = 0.2000, THE REACTOR KW LOAD = 37.

TIME = 0.3000, THE REACTOR KW LOAD = 37.

TIME = 0.4000, THE REACTOR KW LOAD = 37.

TIME = 0.5000, THE REACTOR KW LOAD = 37.

TIME = 0.6000, THE REACTOR KW LOAD = 37.

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TIME = 17.1000, THE REACTOR KW LOAD = 37.

50 HZ 0.95 FREQUENCY AND VOLTAGE RECUPERATION TEST FOR FACTORY
AIRCRAFT P & L, S/O 200925, 12 OF, 2050 KW & 350 KVA, THREE LOOPS, UNIT A

PEAK LOAD VOLTAGE 77% WITH RECUPERATION 1.900 SECONDS
MAX. OVERVOLTAGE OCCURS AT 2.1600 SECONDS

TIME	INCREMENTAL LOAD KW	CHANGE IN DEVIATION	NET DEVIATION	NET LOAD KW	AVAILABLE LOAD KW
0.10	36.80	0.01073	0.01073	1436.80	0.0 0.
0.20	36.00	0.01073	0.02147	1436.00	0.0 0.
0.30	36.30	0.01073	0.03220	1436.30	0.0 0.
0.40	36.00	0.01073	0.04294	1436.00	0.0 0.
0.50	36.80	0.01073	0.05367	1436.80	0.0 0.
0.60	37.42	0.01071	0.06440	1437.42	0.0 0.
0.70	38.93	0.01109	0.07567	1438.93	0.0 0.
0.80	39.64	0.01122	0.08694	1439.64	0.0 0.
0.90	39.26	0.01145	0.09839	1439.26	0.0 0.
0.94	39.87	0.00459	0.10239		
DEVIATION AT RECUPERATION =	0.102				
MAXIMUM DEVIATION =	0.102				
TIME OF MAXIMUM DEVIATION TO 98.0 PERCENT =	0.935				
MAX. DELIVERY-LINE =	0.752				

STEP NO. 8 THE STARTING TIME IS 90.00 SECONDS
THE LOADS ARE AS FOLLOWS

FULL ROLLING

LOAD KW HP

EXISTING 1401

CHILLED 0

WATER 504

COOLED 0

WATER 487

COOLED 0

WATER 610

COOLED 0

WATER 627

COOLED 0

WATER 634

COOLED 0

WATER 641

COOLED 0

WATER 648

COOLED 0

WATER 655

COOLED 0

WATER 658

COOLED 0

WATER 665

COOLED 0

WATER 672

COOLED 0

WATER 679

COOLED 0

WATER 686

COOLED 0

WATER 693

COOLED 0

WATER 697

COOLED 0

WATER 704

COOLED 0

WATER 711

COOLED 0

WATER 718

COOLED 0

WATER 725

COOLED 0

WATER 732

COOLED 0

WATER 739

COOLED 0

WATER 746

COOLED 0

WATER 753

COOLED 0

WATER 760

COOLED 0

WATER 767

COOLED 0

WATER 774

COOLED 0

WATER 781

COOLED 0

WATER 788

COOLED 0

WATER 795

COOLED 0

WATER 802

COOLED 0

WATER 809

COOLED 0

WATER 816

COOLED 0

WATER 823

COOLED 0

WATER 830

COOLED 0

WATER 837

COOLED 0

WATER 844

COOLED 0

WATER 851

COOLED 0

WATER 858

COOLED 0

WATER 865

COOLED 0

WATER 872

COOLED 0

WATER 879

COOLED 0

WATER 886

COOLED 0

WATER 893

COOLED 0

WATER 900

COOLED 0

WATER 907

COOLED 0

WATER 914

COOLED 0

WATER 921

COOLED 0

WATER 928

COOLED 0

WATER 935

COOLED 0

WATER 942

COOLED 0

WATER 949

COOLED 0

WATER 956

COOLED 0

WATER 963

COOLED 0

WATER 969

COOLED 0

WATER 976

COOLED 0

WATER 983

COOLED 0

WATER 990

COOLED 0

WATER 997

COOLED 0

WATER 1004

COOLED 0

WATER 1011

COOLED 0

WATER 1018

COOLED 0

WATER 1025

COOLED 0

WATER 1032

COOLED 0

WATER 1039

COOLED 0

WATER 1046

COOLED 0

WATER 1053

COOLED 0

WATER 1060

COOLED 0

WATER 1067

COOLED 0

WATER 1074

COOLED 0

WATER 1081

COOLED 0

WATER 1088

COOLED 0

WATER 1095

COOLED 0

WATER 1102

COOLED 0

WATER 1109

COOLED 0

WATER 1116

COOLED 0

WATER 1123

COOLED 0

WATER 1130

COOLED 0

WATER 1137

COOLED 0

WATER 1144

COOLED 0

WATER 1151

COOLED 0

WATER 1158

COOLED 0

WATER 1165

COOLED 0

WATER 1172

COOLED 0

WATER 1179

COOLED 0

WATER 1186

COOLED 0

WATER 1193

COOLED 0

WATER 1200

COOLED 0

WATER 1207

COOLED 0

WATER 1214

COOLED 0

WATER 1221

COOLED 0

WATER 1228

COOLED 0

WATER 1235

COOLED 0

WATER 1242

COOLED 0

WATER 1249

COOLED 0

WATER 1256

COOLED 0

WATER 1263

COOLED 0

WATER 1270

COOLED 0

WATER 1277

COOLED 0

WATER 1284

COOLED 0

WATER 1291

COOLED 0

WATER 1298

COOLED 0

WATER 1305

COOLED 0

WATER 1312

COOLED 0

WATER 1319

COOLED 0

WATER 1326

COOLED 0

WATER 1333

COOLED 0

WATER 1340

COOLED 0

WATER 1347

COOLED 0

WATER 1354

COOLED 0

WATER 1361

COOLED 0

WATER 1368

COOLED 0

WATER 1375

COOLED 0

WATER 1382

COOLED 0

WATER 1389

COOLED 0

WATER 1396

COOLED 0

WATER 1403

COOLED 0

WATER 1410

COOLED 0

STEP NO. 9 THE STARTING TIME IS 120.00 SECONDS
THE LOADS ARE AS FOLLOWS

LOAD UNIT RATING

107. *Leptodora* *hirsutifrons* *var.* *hirsutifrons* (L.) *Wittmer*

THE ACCUMULATED RESISTIVE LOAD IS 453. KM.

THE REGULATED SYSTEM INDEX IS 46962. LB

THE BUSH FOWER FOR THE MOTORS AT THIS STEP.

Yield DPF = May 1995 Yield DPF = June 1995 Yield DPF = July 1995

WILHELM WEDDE 10 sep. 6 P.M.NI = 0.07
WILHELM WEDDE 10 sep. 6 P.M.NI = 0.07

MOTOR THICKNESS = 4.67 MM
MOTOR DIAMETER = 15.24 MM
MOTOR WEIGHT = 1.067 GRS

THE FULL LOAD TORQUE IS 342 LB-FT AND THE EFFICIENCY IS 69%.

$\text{Lan}_1 \circ \text{U}_2 = \text{Lan}_2 \circ \text{U}_1$

TIME LINE
TIME LINE

LINE TUBE

THE IMPULSE LINE IS 4.5000 KW = 100% TURBINE

INFECTIVE TIME = 1,0000, KM = 115.

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INPUT- TIME = 4,9000, KW = 222, LINE

TIME = $\frac{2\pi}{2\pi - \alpha}$ SECONDS.
LOAD = $\frac{2\pi}{2\pi - \alpha}$
WITH PEAK VOLTAGE = $\frac{1}{2} \cdot 10^3$

EFFICACY 1 DAY MEAN = 322 AND OUTLINES ST 1-90

THESE EVIDENCE OCCURS AND OCCURRED AT 2:10 WITH 'RECOVER

TIME INCREMENTAL LOAD-XW CHANGE IN DEVI

6.13 313-A2 0.02
6.20 313-A3 0.00

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AMERICAN SCAFFOLDING & CONCRETE FORMING ASSOCIATION, INC., PLAINTIFF, v. DEFENDANT, CHIEF, POLICE DEPARTMENT, CITY OF NEW YORK, ET AL., DEFENDANTS.

DEVIATION AT INFLECTION =	0.420
SYSTEMIC DEVIATION =	-0.367
ANATOMIC DEVIATION =	-0.326
TIME OF MAXIMUM DEVIATION =	0.427
TIME OF 50 PERCENT RECOVERY =	0.457
TIME OF 95.5 PERCENT =	0.50
TIME OF RECOVERY END =	0.539

ENGINE RATED AT 2850.0 KW AT 900.0 RPM, OF 12 CYLINDERS2. STROKES PER CYCLE
WITH CAPABILITY OF 120.0 PERCENT LOAD, AND WITH 34572. LB-FT-SQD INERTIA

GENERATOR RATED AT 4063. KVA AND HAS THE FOLLOWING PROPERTIES:
 TRANSIENT REACTANCE 26.20 PERCENT
 SUBTRANSIENT REACTANCE 13.40 PERCENT
 TIME CONSTANT 5.08 SECONDS
 FULL LOAD FIELD VOLTAGE 72. VOLTS
 NO-LOAD FIELD VOLTAGE 52. VOLTS
 MAXIMUM FIELD VOLTAGE = FORCING 455. VOLTS
 THE CORRECTED SUB-TRANSIENT REACTANCE IS 21.933 PERCENT

THE POINT FOR DEFINITION OF RECOVERY FOR VOLTAGE IS 90. PERCENT AND FOR FREQUENCY IS 98. PERCENT

THE FOLLOWING CONSTANTS ARE BEING USED FOR THESE COMPUTATIONS:

GENERATOR DIP CONSTANT 1667.
 EXCITER RECOVERY RATE .5.00
 SYSTEM CONSTANT .420.
 BASE LOAD CONSTANT 0.510
 EXISTING LOAD FACTOR IS 1.500
 LOAD RECOVERY RATE 0.250 PER SECOND
 TURBO C IS 1.00 TURBO RESPONSE FACTOR IS 0.9500
 THE TIME INCREMENT IN THE CALCULATION IS 0.10 SECONDS
 VOLTAGE OVERTHROW CONSTANT IS 0.60
 FLAG 20 SET @ 2
 RACK DEAD TIME CONSTANT IS 0.0270
 GOV FROPTNL FACTOR 1.3500 GOVERNOR DEAD BAND IS 0.1000
 FRICTION HP RATIO = 0.1500

ACCELERATION CONSTANT (C2) = 0.0034000366 ENGINE/GOV. DEAD TIME = 0.3762221336

STEP NO# 1 THE STARTING TIME IS 0.0 SECONDS

THE LOADS ARE AS FOLLOWS:

LOAD KW	HP	FCT UNIT RATING
EXISTING 1644.	57.68	
ADDED 0.	0.0	
MOTORS 501.	605.	17.60
NET LOAD 2145.		75.28

THE ACCUMULATED RESITIVE LOAD IS 0. KW, 0.0 PERCENT RATING
 THE ACCUMULATED SYSTEM INERTIA IS 34572. LB-FT-SQRD -- C2P = 0.0034000361

THE INRUSH POWER FOR THE MOTORS AT THIS STEP IS 3729. SKVA AND THE CORRECTED INRUSH POWER IS 3729. SKVA

VOLTAGE DIP =	16.757
TIME OF MAXIMUM VOLTAGE DIP =	0.105
RECOVERY TIME TO 90.0 PERCENT =	0.226
TOTAL RECOVERY TIME =	0.387
0.051	0.118

MOTOR NUMBER 1 MOTOR RATING = 455. HP AT 1780. RPM,
 THE MOTOR HAS 335. LB-FT SQUARED INERTIA AND WILL HAVE A 377. KW LOAD WHEN RUNNING.
 FULL LOAD TORQUE IS 1343. LB-FT
 FULL LOAD KW IS 377. AT AN ASSUMED EFFICIENCY OF 90 PERCENT.
 FLAG 1 = 0. FLAG 2 = 0. FLAG 3 = 0.

INPUTS- PERCENT		AVERAGE		OUTPUT-		PERCENT		CORRECTED		PERCENT		INCREMENTL		ACCUM.		INCREMENTL	
SPEED	MOTOR	LOAD	MOTOR	LOAD	TIME	AV. TERM	MOTOR	NET	SPEED	PERCENT	INCREMENTL	KW LOAD	SPEED	CHANGE	SPEED	PERCENT	KW LOAD
INCREMENT	TORQUE	TORQUE	TORQUE	TORQUE	SECONDS	VOLTAGE	TORQUE	TORQUE	TORQUE	CHANCE	CHANGE	KW	INCREMENTL	ACCUM.	INCREMENTL	ACCUM.	INCREMENTL
0.0	100.00	15.00	100.50	13.00	0.0	91.62	84.36	71.36	4.95	4.95	0.0	283.	0.0	0.0	283.	0.0	283.
5.00	101.00	15.00	102.50	9.00	0.20	85.80	75.45	66.45	4.61	9.56	587.	540.	0.0	0.0	587.	0.0	587.
10.00	104.00	7.00	102.50	9.00	0.20	85.80	75.45	66.45	4.61	9.56	540.	540.	0.0	0.0	540.	0.0	540.
15.00	106.00	5.00	105.00	6.00	0.30	91.47	89.93	84.93	5.89	15.45	578.	578.	0.0	0.0	578.	0.0	578.
20.00	109.00	5.00	107.50	6.00	0.30	91.47	89.93	84.93	5.89	15.45	578.	578.	0.0	0.0	578.	0.0	578.
25.00	112.00	6.00	110.50	5.50	0.40	97.29	104.60	92.10	6.87	22.32	614.	614.	0.0	0.0	614.	0.0	614.
30.00	115.00	9.00	113.50	7.50	0.50	100.00	113.50	106.00	7.35	29.67	627.	627.	0.0	0.0	627.	0.0	627.
35.00	119.00	12.00	117.00	10.50	0.60	100.00	122.00	107.50	7.45	37.12	638.	638.	0.0	0.0	638.	0.0	638.
40.00	125.00	17.00	122.00	14.50	0.70	100.00	127.50	108.50	7.52	44.65	637.	637.	0.0	0.0	637.	0.0	637.
45.00	130.00	21.00	127.50	19.00	0.80	100.00	144.50	115.50	8.01	52.66	679.	679.	0.0	0.0	679.	0.0	679.
50.00	137.00	26.00	133.50	23.50	0.90	100.00	170.00	137.50	9.53	62.19	778.	778.	0.0	0.0	778.	0.0	778.
55.00	152.00	32.00	144.50	29.00	1.00	100.00	196.00	141.50	9.81	72.00	818.	818.	0.0	0.0	818.	0.0	818.
60.00	172.00	37.00	162.00	34.50	1.10	100.00	195.00	124.50	8.63	80.63	790.	790.	0.0	0.0	790.	0.0	790.
65.00	184.00	44.00	178.00	40.50	1.20	100.00	192.00	113.50	7.87	88.51	757.	757.	0.0	0.0	757.	0.0	757.
70.00	194.00	51.00	182.00	47.50	1.30	100.00	140.00	44.50	3.09	91.59	552.	552.	0.0	0.0	552.	0.0	552.
75.00	198.00	58.00	196.00	54.50	1.40	100.00	140.00	44.50	3.09	94.88	534.	534.	0.0	0.0	534.	0.0	534.
80.00	198.00	66.00	198.00	62.00	1.50	100.00	140.00	44.50	3.09	97.76	526.	526.	0.0	0.0	526.	0.0	526.
85.00	192.00	75.00	195.00	70.50	1.60	100.00	140.00	44.50	3.09	100.05	526.	526.	0.0	0.0	526.	0.0	526.
90.00	192.00	82.00	192.00	78.50	1.70	100.00	192.00	113.50	7.87	88.51	757.	757.	0.0	0.0	757.	0.0	757.
95.00	100.00	93.00	186.00	87.50	1.80	100.00	140.00	44.50	3.09	91.59	552.	552.	0.0	0.0	552.	0.0	552.
100.00	100.00	98.00	140.00	95.50	1.90	100.00	140.00	44.50	3.09	94.88	534.	534.	0.0	0.0	534.	0.0	534.
105.00	100.00	100.00	100.00	100.00	2.00	100.00	140.00	44.50	3.09	97.76	526.	526.	0.0	0.0	526.	0.0	526.
110.00	100.00	100.00	100.00	100.00	2.10	100.00	140.00	44.50	3.09	100.05	526.	526.	0.0	0.0	526.	0.0	526.
115.00	100.00	100.00	100.00	100.00	2.20	100.00	140.00	44.50	3.09	100.05	526.	526.	0.0	0.0	526.	0.0	526.
120.00	100.00	100.00	100.00	100.00	2.30	100.00	140.00	44.50	3.09	100.05	526.	526.	0.0	0.0	526.	0.0	526.
125.00	100.00	100.00	100.00	100.00	2.40	100.00	140.00	44.50	3.09	100.05	526.	526.	0.0	0.0	526.	0.0	526.
130.00	100.00	100.00	100.00	100.00	2.50	100.00	140.00	44.50	3.09	100.05	526.	526.	0.0	0.0	526.	0.0	526.
135.00	100.00	100.00	100.00	100.00	2.60	100.00	140.00	44.50	3.09	100.05	526.	526.	0.0	0.0	526.	0.0	526.
140.00	100.00	100.00	100.00	100.00	2.70	100.00	140.00	44.50	3.09	100.05	526.	526.	0.0	0.0	526.	0.0	526.
145.00	100.00	100.00	100.00	100.00	2.80	100.00	140.00	44.50	3.09	100.05	526.	526.	0.0	0.0	526.	0.0	526.
150.00	100.00	100.00	100.00	100.00	2.90	100.00	140.00	44.50	3.09	100.05	526.	526.	0.0	0.0	526.	0.0	526.
155.00	100.00	100.00	100.00	100.00	3.00	100.00	140.00	44.50	3.09	100.05	526.	526.	0.0	0.0	526.	0.0	526.
160.00	100.00	100.00	100.00	100.00	3.10	100.00	140.00	44.50	3.09	100.05	526.	526.	0.0	0.0	526.	0.0	526.
165.00	100.00	100.00	100.00	100.00	3.20	100.00	140.00	44.50	3.09	100.05	526.	526.	0.0	0.0	526.	0.0	526.
170.00	100.00	100.00	100.00	100.00	3.30	100.00	140.00	44.50	3.09	100.05	526.	526.	0.0	0.0	526.	0.0	526.
175.00	100.00	100.00	100.00	100.00	3.40	100.00	140.00	44.50	3.09	100.05	526.	526.	0.0	0.0	526.	0.0	526.
180.00	100.00	100.00	100.00	100.00	3.50	100.00	140.00	44.50	3.09	100.05	526.	526.	0.0	0.0	526.	0.0	526.
185.00	100.00	100.00	100.00	100.00	3.60	100.00	140.00	44.50	3.09	100.05	526.	526.	0.0	0.0	526.	0.0	526.
190.00	100.00	100.00	100.00	100.00	3.70	100.00	140.00	44.50	3.09	100.05	526.	526.	0.0	0.0	526.	0.0	526.
195.00	100.00	100.00	100.00	100.00	3.80	100.00	140.00	44.50	3.09	100.05	526.	526.	0.0	0.0	526.	0.0	526.
200.00	100.00	100.00	100.00	100.00	3.90	100.00	140.00	44.50	3.09	100.05	526.	526.	0.0	0.0	526.	0.0	526.
205.00	100.00	100.00	100.00	100.00	4.00	100.00	140.00	44.50	3.09	100.05	526.	526.	0.0	0.0	526.	0.0	526.
210.00	100.00	100.00	100.00	100.00	4.10	100.00	140.00	44.50	3.09	100.05	526.	526.	0.0	0.0	526.	0.0	526.
215.00	100.00	100.00	100.00	100.00	4.20	100.00	140.00	44.50	3.09	100.05	526.	526.	0.0	0.0	526.	0.0	526.
220.00	100.00	100.00	100.00	100.00	4.30	100.00	140.00	44.50	3.09	100.05	526.	526.	0.0	0.0	526.	0.0	526.
225.00	100.00	100.00	100.00	100.00	4.40	100.00	140.00	44.50	3.09	100.05	526.	526.	0.0	0.0	526.	0.0	526.
230.00	100.00	100.00	100.00	100.00	4.50	100.00	140.00	44.50	3.09	100.05	526.	526.	0.0	0.0	526.	0.0	526.
235.00	100.00	100.00	100.00	100.00	4.60	100.00	140.00	44.50	3.09	100.05	526.	526.	0.0	0.0	526.	0.0	526.
240.00	100.00	100.00	100.00	100.00	4.70	100.00	140.00	44.50	3.09	100.05	526.	526.	0.0	0.0	526.	0.0	526.
245.00	100.00	100.00	100.00	100.00	4.80	100.00	140.00	44.50	3.09	100.05	526.	526.	0.0	0.0	526.	0.0	526.
250.00	100.00	100.00	100.00	100.00	4.90	100.00	140.00	44.50	3.09	100.05	526.	526.	0.0	0.0	526.	0.0	526.
255.00	100.00	100.00	100.00	100.00	5.00	100.00	140.00	44.50	3.09	100.05	526.	526.	0.0	0.0	526.	0.0	526.
260.00	100.00	100.00	100.00	100.00	5.10	100.00	140.00	44.50	3.09	100.05	526.	526.	0.0	0.0	526.	0.0	526.
265.00	100.00	100.00	100.00	100.00	5.20	100.00	140.00	44.50	3.09	100.05	526.	526.	0.0	0.0	526.	0.0	526.
270.00	100.00	100.00	100.00	100.00	5.30	100.00	140.00	44.50	3.09	100.05	526.	526.	0.0	0.0	526.	0.0	526.
275.00	100.00	100.00	100.00	100.00	5.40	100.00	140.00	44.50	3.09	100.05	526.	526.	0.0	0.0	526.	0.0	526.
280.00	100.00	100.00	100.00	100.00	5.50	100.00	140.00	44.50	3.09	100.05	526.	526.	0.0	0.0	526.	0.0	526.
285.00	100.00	100.00	100.00	100.00	5.60	100.00	140.00	44.50	3.09	100.05	526.	526.	0.				

AN320010 FREQUENCY AND VOLTAGE EXCURSION PREDICTIONS PROGRAM
ARKANSAS P & L, S/O 205925, 12 OP, 2850 KW @ 900 RPM, SPECIAL LOADS/DL

PAGE 3

APPENDIX B4

25.00	219.00	1.56	220.50	1.18	0.20	85.80	166.36	165.79	8.36	17.85	283.
30.00	218.00	2.70	218.50	2.13	0.30	91.47	182.80	180.67	9.10	26.95	295.
35.00	215.00	4.29	216.50	3.49	0.40	97.29	202.09	196.75	9.92	36.87	310.
40.00	212.00	6.40	213.50	5.34	0.50	100.00	206.50	195.69	9.86	46.73	306.
45.00	209.00	9.11	210.50	7.76							
50.00	204.00	12.50	206.50	10.81							
55.00	201.00	16.64	202.50	14.57							
60.00	197.00	21.60	199.00	19.12							
65.00	194.00	27.46	195.50	24.53							
70.00	189.00	34.30	191.50	30.88							
75.00	189.00	42.19	189.00	38.24							
80.00	188.00	51.20	188.50	46.69							
85.00	201.00	61.41	194.50	56.31							
90.00	231.00	72.90	216.00	67.16							
95.00	260.00	85.74	245.50	79.32							
100.00	100.00	100.00	180.00	92.87							
					1.10	100.00	180.00	87.13	4.39	91.05	232.
					1.20	100.00	180.00	87.13	4.39	95.44	228.
					1.30	100.00	180.00	87.13	4.39	99.83	224.

TOTAL EQUIVALENT ENERGY = 273.77295

DEGREE OF SEVERITY = 220.19275

PEAK MOTOR LOAD = 319. AT 0.1000SECONDS

PEAK LOAD KW = 1099. AND OCCURS AT 1.00

MAX. OVERVOLTAGE OCCURS AT 1.60 WITH RECOVERY AT 2.57

TIME	INCREMENTAL LOAD-KW	CHANGE IN DEVIATION	NET DEVIATION	NET LOAD-KW	AVAILABLE LOAD-KW
0.10	905.75	0.30796	0.30796	2549.75	0.0 0.
0.20	823.82	0.28010	0.58806	2467.82	0.0 0.
0.30	873.74	0.29708	0.88514	2517.74	0.0 0.
0.40	924.34	0.31428	1.19941	2568.34	0.0 0.
0.41	933.42	0.01760	1.21702		
0.50	933.42	-0.04606	1.17096	2577.42	2720.83 2.
0.60	926.61	-0.06362	1.10734	2570.61	2757.73 2.
0.70	913.69	-0.08059	1.02675	2557.69	2794.72 2.
0.80	939.98	-0.08426	0.94249	2583.98	2831.81 2.
0.90	1032.07	-0.06552	0.87696	2676.07	2868.78 2.
1.00	1099.40	-0.05506	0.82191	2743.40	2905.33 2.
1.10	1022.35	-0.09357	0.72833	2666.35	2941.56 2.
1.20	984.48	-0.11884	0.60950	2628.68	2978.20 2.
1.30	775.74	-0.20241	0.40708	2419.74	3015.07 2.
1.40	667.06	-0.25228	0.15481	2311.06	3053.04 2.

DEVIATION AT INFLECTION = 0.217
 SYSTEM DEAD TIME = 0.406 1.217
 MAXIMUM DEVIATION = 0.406
 TIME OF MAXIMUM DEVIATION = 0.0
 TIME OF RECOVERY TO 20.0 PERCENT = 0.0
 TOTAL RECOVERY TIME = 1.458

STEP NO. 2 THE STARTING TIME IS 00.00 SECONDS
 THE LOADS ARE AS FOLLOWS

LOAD KW	HP	PCI	UNIT RATING
EXISTING	2125	74.56	
ADDED	0.	0.0	
MOTORS	560.	676.	19.66
NET LOAD	2665.		94.22

THE ACCUMULATED RESISTIVE LOAD IS 35247 KW LB-FT-SQRD = C2F = 0.0033349234

THE INRUSH POWER FOR THE MOTORS AT THIS STEP IS 4004. SKVA AND THE CORRECTED INRUSH POWER IS 4004. SKVA

VOLTAGE DIP = 17.773
 TIME OF MAXIMUM VOLTAGE DIP = 0.111
 RECOVERY TIME TO 90.0 PERCENT = 0.253
 TOTAL RECOVERY TIME = 0.418

MOTOR NUMBER 1 MOTOR RATING = 676. HP AT 1800 RPM
 THE MOTOR HAS 600 LB-FT SQUARED INERTIA AND WILL HAVE A 490. KW LOAD WHEN RUNNING.
 FULL LOAD TORQUE IS 1972. LB-FT
 FULL LOAD KW IS 560. AT AN ASSUMED EFFICIENCY OF 90 PERCENT.
 FLAG 1 = 0. FLAG 2 = 2. FLAG 3 = 0.

INPUT- TIME = 0.0 KW =	672.	TIME = 0.1000, INCREMENTAL KW LOAD = 672.
		TIME = 0.2000, INCREMENTAL KW LOAD = 672.
		TIME = 0.3000, INCREMENTAL KW LOAD = 672.
		TIME = 0.4000, INCREMENTAL KW LOAD = 672.
		TIME = 0.5000, INCREMENTAL KW LOAD = 672.
		TIME = 0.6000, INCREMENTAL KW LOAD = 604.
		TIME = 0.7000, INCREMENTAL KW LOAD = 695.
		TIME = 0.8000, INCREMENTAL KW LOAD = 706.
		TIME = 0.9000, INCREMENTAL KW LOAD = 717.
		TIME = 1.0000, INCREMENTAL KW LOAD = 728.
INPUT- TIME = 1.0000, KW =	728.	TIME = 1.1000, INCREMENTAL KW LOAD = 762.
		TIME = 1.2000, INCREMENTAL KW LOAD = 792.
		TIME = 1.3000, INCREMENTAL KW LOAD = 822.
		TIME = 1.4000, INCREMENTAL KW LOAD = 853.
		TIME = 1.5000, INCREMENTAL KW LOAD = 897.
INPUT- TIME = 1.5000, KW =	897.	TIME = 1.6000, INCREMENTAL KW LOAD = 1009.
		TIME = 1.7000, INCREMENTAL KW LOAD = 1124.
INPUT- TIME = 1.7000, KW =	1124.	TIME = 1.8000, INCREMENTAL KW LOAD = 1401.
INPUT- TIME = 1.8000, KW =	1401.	TIME = 1.9000, INCREMENTAL KW LOAD = 1401.
INPUT- TIME = 1.9000, KW =	1401.	TIME = 2.0000, INCREMENTAL KW LOAD = 560.

PEAK LOAD = 1401. AT 1.9000 SECONDS
 WITH PEAK VOLTAGE AT 2.1000

PEAK LOAD KW = 1401. AND OCCURS AT 1.90
 MAX. OVERVOLTAGE OCCURS AT 2.10 WITH RECOVERY AT 3.13

TIME	INCREMENTAL LOAD-KW	CHANGE IN DEVIATION	NET DEVIATION	NET LOAD-KW	AVAILABLE LOAD-KW
0.10	672.39	0.22424	0.22424	2797.39	0.0 0.
0.20	672.39	0.22424	0.44848	2797.39	0.0 0.
0.30	672.39	0.22424	0.67271	2797.39	0.0 0.
0.40	672.39	0.22424	0.89695	2797.39	0.0 0.
0.40	672.39	0.00668	0.90363		
0.50	672.39	-0.16318	0.74048	2797.39	3301.72 2.
0.60	683.60	-0.17404	0.56641	2908.60	3330.47 2.
0.70	694.81	-0.17993	0.38649	2819.81	3359.33 2.
0.80	706.01	-0.18582	0.20067	2831.01	3388.21 2.
0.90	717.22	-0.19040	0.01027	2842.22	3413.14 3.

DEVIATION AT INFLECTION = 0.904
 SYSTEM DEAD TIME = 0.403
 MAXIMUM DEVIATION = 0.904
 TIME OF MAXIMUM DEVIATION = 0.403
 TIME OF RECOVERY TO 98.0 PERCENT = 0.0
 TOTAL RECOVERY TIME = 0.905

STEP NO# 3 THE STARTING TIME IS 90.00 SECONDS
 THE LOADS ARE AS FOLLOWS:

LOAD KW	HP	PCT UNIT RATING
EXISTING	1450.	50.00
ADDED	0.	0.0
MOTORS	535.	646.
NET LOAD	1935.	18.79
		69.67

THE ACCUMULATED RESITIVE LOAD IS 0. KW, 0.0 PERCENT RATING
 THE ACCUMULATED SYSTEM INERTIA IS 35847. LB-FT-SQRD -- C2P = 0.0032791041

THE INRUSH POWER FOR THE MOTORS AT THIS STEP IS 3828. SKVA AND THE CORRECTED INRUSH POWER IS 3828. SKVA

VOLTAGE DIP = 17.126
 TIME OF MAXIMUM VOLTAGE DIP = 0.107
 RECOVERY TIME TO 90.0 PERCENT = 0.235
 TOTAL RECOVERY TIME = 0.396
 0.052 0.121

MOTOR NUMBER 1 MOTOR RATING = 646. HP AT 1800. RPM.
 THE MOTOR HAS 600. LB-FT SQUARED INERTIA AND WILL HAVE A 473. KW LOAD WHEN RUNNING.
 FULL LOAD TORQUE IS 1805. LB-FT
 FULL LOAD KW IS 535. AT AN ASSUMED EFFICIENCY OF 90 PERCENT.
 FLAG 1 = 0. FLAG 2 = 2. FLAG 3 = 0.

INPUT- TIME = 0.0 , KW = 643. TIME = 0.1000, INCREMENTAL KW LOAD = 643.

INPUT- TIME = 0.5000, KW =	643.	TIME = 0.2000, INCREMENTAL KW LOAD = 643.
		TIME = 0.3000, INCREMENTAL KW LOAD = 643.
		TIME = 0.4000, INCREMENTAL KW LOAD = 643.
		TIME = 0.5000, INCREMENTAL KW LOAD = 643.
INPUT- TIME = 1.0000, KW =	696.	TIME = 0.6000, INCREMENTAL KW LOAD = 653.
		TIME = 0.7000, INCREMENTAL KW LOAD = 664.
		TIME = 0.8000, INCREMENTAL KW LOAD = 675.
		TIME = 0.9000, INCREMENTAL KW LOAD = 685.
		TIME = 1.0000, INCREMENTAL KW LOAD = 696.
INPUT- TIME = 1.5000, KW =	857	TIME = 1.1000, INCREMENTAL KW LOAD = 728.
		TIME = 1.2000, INCREMENTAL KW LOAD = 760.
		TIME = 1.3000, INCREMENTAL KW LOAD = 792.
		TIME = 1.4000, INCREMENTAL KW LOAD = 825.
		TIME = 1.5000, INCREMENTAL KW LOAD = 857.
INPUT- TIME = 1.7000, KW =	1071.	TIME = 1.6000, INCREMENTAL KW LOAD = 964.
		TIME = 1.7000, INCREMENTAL KW LOAD = 1071.
INPUT- TIME = 1.8000, KW =	1339.	TIME = 1.8000, INCREMENTAL KW LOAD = 1339.
INPUT- TIME = 1.9000, KW =	1339.	TIME = 1.9000, INCREMENTAL KW LOAD = 1339.
INPUT- TIME = 2.0000, KW =	535.	TIME = 2.0000, INCREMENTAL KW LOAD = 535.
PEAK LOAD = 1339. AT 1900 SECONDS WITH PEAK VOLTAGE AT 2.1000		PEAK LOAD KW = 1339 AND OCCURS AT 2.10 WITH RECOVERY AT 3.09 MAX. OVERVOLTAGE OCCURS AT 2.10 WITH RECOVERY AT 3.09
TIME INCREMENTAL LOAD-KW	CHANGE IN DEVIATION	NET DEVIATION
0.10 642.55	0.21070	0.21070
0.20 642.55	0.21070	0.42140
0.30 642.55	0.21070	0.63210
0.40 642.55	0.21070	0.84280
0.50 642.55	0.00990	0.85270
0.60 653.26	-0.14921	0.72039
0.70 663.97	-0.15961	0.57118
0.80 674.68	-0.17000	2103.26
0.90 685.39	-0.18040	2113.97
		2092.55
		2515.95 2.
		2558.29 2.
		2600.71 2.
		2643.13 2.
		2685.54 2.
DEVIATION AT INFLECTION =	0.853	
SYSTEM DEAD TIME =	0.405	
MAXIMUM DEVIATION =	0.853	
TIME OF MAXIMUM DEVIATION	0.405	
TIME OF RECOVERY TO 98.0 PERCENT =	0.932	
TOTAL RECOVERY TIME =	0.932	