MCB

1978

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POWER SYSTEM ANALYSIS

Atlantic Division
Naval Facilities Engineering Command

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ATLANTIC DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
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15 MAR 1978

From: Commander, Atlantic Division, Naval Facilities Engineering Command
To: Commanding General, Marine Corps Base, Camp Lejeune, North Carolina

Subj: Power System Analysis and Planning (1978, Marine Corps Base, Camp Lejeune, North Carolina)

Encl: (1) Power System and Planning (1978, Marine Corps Base, Camp Lejeune, N. C.)

1. As requested by Engineering Service Request No. U6110-19F18K01, a computer assisted utilities system analysis for the Electrical Power Distribution System at Camp Lejeune, North Carolina, has been accomplished.

2. A major change in the electrical distribution system occurred in 1977, when Phase I of P-754 (Contract N62370-74-C-1345) was completed. During this phase, the system was expanded from six to nine major radial feeders. In addition, Carolina Power and Light has centrally relocated its main substation and increased its service voltage from 110 KV to 230 KV.

3. Phase II of P-574 Electrical Distribution Improvements is currently scheduled to be ready for award sometime in April 1978. Enclosure (1) is forwarded for your information and files. Data from the fault study, relay coordination study, and load flow study should be made available to the A&E currently working on Phase II under Contract N62370-77-C-4732.

E. A. Barco

E. A. BARCO
By direction

POWER SYSTEM ANALYSIS
AND
PLANNING

1978

MARINE CORP BASE
CAMP LEJEUNE, NORTH CAROLINA

PREPARED BY:

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(ENCLOSURE 1)

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SECTION 1

PURPOSE

This power system analysis and planning for the Camp Lejeune complex is a comprehensive analysis used to evaluate current system performance of adequacy, reliability, and to ascertain the effectiveness of alternate plans for system expansion and operation.

The analysis and planning is threefold.

First, it is used to develop a 15 to 20 year master plan which is based on the military construction objectives.

Second, it is used to optimize utilization of capital within DOD funding constraints.

Third, it is used to develop a data base for future analysis, utilizing the Computer Assisted Power System Engineering Program (CAPSE).

SECTION 2

PROCEDURE

This procedure involved the securing of information by field investigations in order to prepare bus-node diagrams of the electrical power system, compile existing load data, and determine circuit configurations and impedances. The existing circuit configuration and loading were entered into a digital computer in order to conduct fault current and loadflow analysis of the present system.

Based on the findings of Loadflow Case No. 1 and Fault Case No. 1 other cases were developed and run.

After the optimum electrical power system was configurated the final fault current study and a loadflow study were conducted on the system. The fault current study is to be used in rating interrupting capacities of equipment and protective devices.

Upon completion of using the CAPSE Program, the data for the computer runs were stored within the computer system. The stored data, which represents the electrical power system parameters and loading, can promptly be modified for future analysis.

SECTION 3

ELECTRICAL POWER SUPPLIES

COMMERCIAL

Electrical power is purchased from the Carolina Power and Light Company at 12.47 KV. The Carolina Power and Light Company serves the Camp Lejeune complex from a 230 KV circuit through a total of 50 MVA of transformer capacity at 12.47 KV.

The total short circuit current available from Carolina Power and Light was calculated to be:

Three Phase = 13118 amps - symmetrical
Line to ground = 13637 amps - symmetrical

SECTION 4

EXISTING ELECTRICAL SYSTEM

The description of the existing system which follows, is reflected in Loadflow Case No. 1L-77 and Fault Current Study Case No. 1F-77. Electrical power is trasmitted at 12.47 KV from the point of Carolina and Power Light Companies service. The distribution is accomplished by nine radial overhead circuits.

Interconnection of feeders is possible by using one or several of sixteen gang operated air breaker switches.

Presently, there are seven voltage regulators on five of the feeders to correct low voltage conditions.

The interupting capacities of the nine Main Substation Oil Circuit Breakers are 500 MVA while the present fault levels are 295 MVA.

Voltages at Midway Park, Paradise Point, Onslow Beach, and the Rifle Range areas are presently reduced and distributed at 2.4 KV.

The power factor at main substation is 90 per cent. RJH

SECTION 5

CAPSE FAULT STUDY

This program produces both three-phase, and single-line to ground fault current information. For each fault, the output data is based on the following:

a. Per-unit resistance and per-unit reactance to the point of fault on a 10 MVA base.

b. MVA at point of fault. Current (actual not per-unit) at point of fault at voltage level of 12.47 KV.

Fault Case No. F1-77

Reference should be made to Bus-node diagram (Section 14) to correlate BUS location with caculated values listed in table below.

Bus #	FAULT VALUES Feeder Description		3Ø MVA	3Ø AMPS	Ø - GND MVA	Ø - GND AMPS
2	Main Bus		283	13118	294	13637
69	Rifle Range		79	3370	53	2437
29	Rifle Range		47	2198	31	1439
4	Rifle Range	1000 KVA REG	25	1145	15	692
72	Rifle Range	BKR 39	20	933	12	555
6	Rifle Range	BKR 43	12	573	7	332
8	Rifle Range	BKR 40	8	378	5	216
79	Rifle Range	End Load	8	353	4	205
10	French Crk	1500 KVA REG	86	3970	64	2948
70	French Crk	(FTC Top)	72	3356	53	2441
12	French Crk	(FTC Load)	62	2885	44	2050
14	Industrial		101	4688	77	3572
16	Reg 2	(Gum St)	162	7517	141	6520
18	Reg 2	(BKR 37)	94	4372	72	3333
62	Reg 2	(BKR 35-36)	93	4311	71	3279
19	Reg 2	(End Run)	79	3656	58	2713
22	Reg 3	(Holcomb Cir)	113	5226	87	4019
23	Reg 3	(End Load)	80	3689	58	2674
24	Reg 1	(BKR 41)	145	6701	111	5166
26	Reg 1	(BKR 33-34-8)	131	6048	99	4584
33	Reg 1	(End Load)	101	4689	76	3511
36	Paradise Pt	(BKR 7)	112	5167	76	3529
34	Paradise Pt	(Hospital)	77	3580	49	2262
38	Paradise Pt	(BKR 18)	59	2715	40	1857
40	Paradise Pt	(Bkr 11)	42	1965	29	1331
43	Capehart	(SUB)	50	2310	33	1539
60	Montford Pt	(Midway)	41	1888	27	1241
52	Montford Pt	(C. Knox)	22	1026	15	697
53	Montford Pt	(BKR 31)	22	1016	15	684
55	Montford Pt	(Camp 1-3)	20	936	14	634
56	Montford Pt	(BKR 42)	21	965	14	650
57	Montford Pt	(Camp 2)	18	817	12	557

NOTE - HAVE A/E'S DESIGN AROUND 250 MVA FAULT CURRENTS IN ORDER TO COVER all CONTINGENCIES.

SECTION 6

SUMMATION OF LOADFLOW CASES

CASE	
PL-77	Proposed system
1L-77	Existing system
2L-77	Industrial Load on Regimental 2 feeder
3L-77	Rifle Range load on French Creek feeder
4L-77	French Creek load on Regimental 2 feeder
5L-77	Regimental 2 load on Regimental 3 feeder
6L-77	Regimental 3 load on Regimental 1 feeder
7L-77	Paradise Point load on Montford Point feeder
8L-77	Capehart load on Montford Point feeder
9L-77	Montford Point load on Paradise Point feeder
10L-77	Regimental 1 load on Regimental 3 feeder
11L-77	Montford Point load on Hospital feeder
12L-77	Total French Creek load on #2/0 AL feeder tap
13L-77	Hospital load on Montford Point feeder
14L-77	System operated as a loop

SECTION 7

LOAD FLOW CASE PL-77 (PROPOSED SYSTEM)

Reference should be made to one-line diagram (Section 15) to correlate location with discussion. The proposed system with necessary modifications to present system to accomodate, projected load growth and correct deficiencies was determined as follows:

a. An additional 600 KVA voltage regulator will need to be installed at the intersection of Marines Road and Sneads Ferry Road to be in series with three existing voltage regulators. This will correct the low voltage condition expected after completion of P613-BEQ construction programmed for FY80.

b. Unswitched capacitor banks are required on Rifle Range feeder to help low voltage condition as follows:

1.	Sneads Ferry Rd at Duncan Street	225 KVAR
2.	End of Duncan Street	150 KVAR
3.	Onslow Beach Breaker 39	600 KVAR
4.	Courthouse Bay area	1400 KVAR
5.	Rifle Range area	150 KVAR
	TOTAL	2525 KVAR

c. The increased load at French Creek area requies a bank of 4000 KVAR unswitched capacitors to help alleviate the probability of low voltage conditions in the event it becomes necessary to put the Rifle Range load on to the French Creek feeder as shown on Case 3L-77.

d. A bank of unswitched capacitors rated 2400 KVAR will be required at the Capehart Area to help correct low voltage conditions.

e. A possible voltage correction can be made by taps on transformers on the new hospital feeder to correct for 5% voltage drop expected.

f. A 1500 KVA voltage regulator will be required on Montford Point feeder to correct low voltage conditions expected at Brewster Avenue area. This correction would eleviate low voltage problem in the event that Montford Point feeder was required to carry the hospital load in an emergency. Current plans are to provide this regulator under Project P600.

g. A bank of unswitched capacitors rated at 500 KVAR will be required at Montford Point near Camp 1-2 to allow this feeder to serve as an emergency backup for new hospital load.

h. A bank of unswitched capacitors rated at 2200 KVAR will be required at new hospital site to reduce reactive power in this area to allow this load to be served adequately by the Montford Point feeder.

i. Last minute changes to Rifle Range load requires an additional 75 KVA voltage regulator and 150 KVAR of unswitched capacitors to be installed under Project P-243 in FY 79. This will correct the low voltage conditions caused by a new air conditioning load at Onslow Beach area.

j. The proposed loading of the ten radial feeders is as follows:

		Connected KVA	MVA Load/ Rated MVA	Percent of Rated Capacity
1.	Montford Point	9493	3.10/11.4	27%
2.	Regimental 1 +P611 +P-614	12045	7.54/11.4 8.16 / 11.4	66% 71.4%
3.	Rifle Range	11262 11 MVA	5.47/6.6	83% + P607
4.	Paradise Point	7500	6.40/10.3	62%
5.	French Creek	11177	5.73/11.4	50%
6.	Capehart	6537	5.93/11.4	52%
7.	Industrial	10525	3.98/6.6	60%
8.	Regimental 2	11083	6.38/10.3	62%
9.	Regimental 3	4798	2.63/10.3	25%
10.	New Hospital	9200	4.94/11.4	43%

k. The proposed system was determined by considering the increased electrical load imposed by the following projects:

P-062	Mess Hall Modernization Phase II	FY 78
P-065	Physical Fittness Center	FY 78
P-117	Operational & Maintenance Facility	FY 79
P-138	Auto Vehicle Shop	FY 78
P-160	Heat Plant Expansion	FY 74
P-216	BEQ's 5th Increment	FY 79
P-243	BEQ'S	FY 78
P-255	Combat Vehicle Maintenance Shop	FY 79
P-419	Dining Facility	FY 77
P-570	BEQ's (French Crk)	FY 77
P-574	Electrical Distribution Changes	FY 74
P-600	Dental Clinic	FY 77
P-600	New Hospital	FY 79
P-605	Dispensary	FY 79
P-610	Heat Plant Emission Control	FY 77
P-613	BEQ (Hadnot Pt)	FY 80
P-706	Dispersing Bldg.	FY 78
P-714	Headquarter FAC DIV SUP GP	FY 7T
P-715	Alterations to Bldg. 3	FY 77
P-720	Training Facility	FY 78

(P-611 [illegible] 750KVA)

SECTION 8

LOADFLOW CASE NO. 1L-77 (EXISTING SYSTEM)

The existing system with no modifications to present system was analyzed under normal operating conditions. All monitored lines were within ratings. A 7% voltage drop was determined to exist on the Montford Point feeder at the Camp Knox load. The feeder with the largest load was the Capehart feeder which indicated a 6.7 MVA load and is rated at 11.4 MVA. The overall station load was 40 MVA and is rated at 50 MVA.

a. The nine radial feeders are loaded as follows:

	MVA LOAD/ RATED MVA	PERCENT OF RATED CAPACITY
1. Montford Point	3.28/11.4	29%
2. Regimental 1	4.60/11.4	40%
3. Rifle Range	3.07/6.6	46%
4. Paradise Point	6.40/10.3	62%
5. French Creek	3.58/11.4	31%
6. Capehart	6.72/11.4	59%
7. Industrial	3.98/6.6	60%
8. Regimental 2	5.88/10.3	57%
9. Regimental 3	2.61/10.3	25%

These loads are based upon July 1977 peak loads.

SECTION 9

LOADFLOW CASES NO. 2L-77/14L77

Loadflow Cases 2L-77/14L77 were made to determine the effects of interties between feeders in emergency cases. These cases were also used to determine the proposed system requirements.

Reference should be made to bus-node diagram (Section 14) and one-line diagram (Section 15) to correlate node discussion with location in cases discussed below:

Case 2L-77 (Industrial Load on Regimental 2 Feeder)

In the event that Main Breaker 7 is out, a switch can be closed between nodes 14-16 at Gum Street to put the Industrial load on to Regimental 2 feeder. Computer calculations were obtained using a peak demand factor of fifty-six percent on the Regimental 2 feeder and thirty-seven percent peak demand factor on the Industrial feeder. The crucial points for this temporary arrangements are listed below:

a. Nodes 15-16, a load of 9.9 MVA can be expected on #4/0 Regimental 2 bottom circuit along Holcomb Boulevard which is rated at 10.3 MVA.

Case 3L-77 (Rifle Range Load on French Creek Feeder)

In the event that Main Breaker 3 is out, a switch can be closed between nodes 29-27 along Main Service Road to put the Rifle Range load onto the French Creek feeder. Computor calculations were obtained using a peak demand factor of fifty-five percent on French Creek feeder and thirty percent on the Rifle Range feeder. The crucial points for this temporary arrangement are listed below:

a. Nodes 2-10, a load of 11.2 MVA can be expected on #336.4 ACSR French Creek feeder rated at 11.4 MVA.

b. Nodes 10-11, a load of 10.8 MVA can be expected on 1500 KVA regulator rated at 15 MVA.

c. Nodes 11-70, a load of 8.7 MVA can be expected on #4/0 section of French Creek feeder along Main Service Road which is rated at 10.3 MVA.

d. Node 77, a 5.6% voltage drop can be expected at Courthouse Bay area.

e. Node 3, a 5.3% voltage drop can be expected at Lyman Road and Sneads Ferry Road area.

Case 4L-77 (French Creek Load on Regimental 2 Feeder)

In the event that Main Breaker 5 is out, a switch can be closed between nodes 91-10 to put the French Creek load onto Regimental 2 feeder. Computor calculations were obtained using a peak demand factor of fifty-five percent on French Creek feeder and fifty-six percent on Regimental 2 feeder. The crucial points for this temporary arrangement are listed below:

a. Nodes 15-16, a load of 11.3 MVA can be expected on #4/0 Regimental 2 bottom circuit along Holcomb Boulevard which is rated at 10.3 MVA. This represents a 10% overload.

b. Nodes 65-98-99, a 5% voltage drop can be expected at Regimental 2 area loads.

Case 5L-77 (Regimental 2 Load on Regimental 3 Feeder)

In the event that Main Breaker 8 is out, a switch can be closed between nodes 19-22 to put Regimental 2 load on Regimental 3 feeder. Computor calculations were obtained using a peak demand factor of fifty-six percent on Regimental 2 feeder and fifty-four percent on Regimental 3 feeder. The crucial points for this tempory arrangement are listed below:

a. Nodes 20-21, a load of 8.6 MVA can be expected on #4/0 Regimental 3 top circuit along Holcomb Boulevard which is rated at 10.3 MVA.

b. Node 65, a 5% voltage drop can be expected at the L Street load.

Case 6L-77 (Regimental 3 Load on Regimental 1 Feeder)

In the event that Main Breaker 9 is out, a switch can be closed between nodes 28-22 to put Regimental 3 load on to Regimental 1 feeder. Computor calculations were obtained using a peak demand factor of fifty-four percent for Regimental 3 feeder and fourty-one percent for Regimental 1 feeder. The crucial points for this temporary arrangement are listed below:

a. Nodes 2-24, a load of 10.3 MVA can be expected on #336.4 ACSR bottom circuit of 3 circuit armless construction span leading from Main Substation to Breaker 41 which is rated at 11.4 MVA.

b. Nodes 26-28, a load of 3 MVA can be expected on #4/0 CU run leaving Breaker 33 along Main Service Road which is rated at 10.3 MVA.

Case 7L-77 (Paradise Point Load on Montford Point Feeder)

In the event that Main Breaker 4 is out, switches can be closed between nodes 40-41, 41-58, 58-47; switches can be opened at nodes 41-43, 2-35 to put Paradise Point load on to Montford Point feeder. Computor calculations were obtained using a peak demand factor of seventy-nine percent for Paradise Point and thirty-three percent for the Montford Point feeder. The crucial Points are listed below:

a. Nodes 46-108, a load of 11.2 MVA can be expected on #4/0 circuit along Holcomb Boulevard which is rated at 10.3 MVA. This represents an 8% overload.

b. Nodes 38-48-53, low voltage condition would prevail at approximately 11% voltage drop at Montford Point area, 8.5% voltage drop at Midway Park, and 17% voltage drop at Paradise Point area.

Case 8L-77 (Capehart Load on Montford Point Feeder)

In the event that Main Breaker 6 is out, switches can be closed between nodes 41-58, 58-47 to put Capehart load on to Montford Point feeder. Computer calculations were obtained using a peak demand factor of ninty-six percent for the Capehart feeder and thirty-three percent for Montford feeder. The crucial points are listed below:

a. Nodes 2-46, a load of 9.8 MVA can be expected on #336.4 ACSR section from substation which is rated at 11.4 MVA.

b. Nodes 46-108, a load of 9.8 MVA can be expected on #4/0 run along Holcomb Boulevard to Brewster Avenue which is rated at 10.3 MVA.

c. Nodes 47-58, a load of 5.8 MVA can be expected on #1/0 by pass section which is rated at 6.6 MVA.

Case 9L-77 (Montford Point Load on Paradise Point Feeder)

In the event that Main Breaker 1 is out, switches can be closed between nodes 40-41, 58-41,58-59,59-50, open switch between 41-43, to put Montford Point load on to Paradise Point feeder. Computer calculations were obtained using a peak demand factor of thirty-three percent for Montford Point and seventy-nine percent for Paradise Point. The crucial points are listed below:

a. Nodes 2-35, a load of 10.5 MVA can be expected on #336.4 ACSR run leading out of substation which is rated at 11.4 MVA.

b. Nodes 35-36, a load of 10.5 MVA can be expected on #4/0 top circuit along Main Service Road which is rated at 10.3 MVA.

c. Nodes 36-37, a load of 10.2 MVA can be expected on 1000 KVA regulator which is rated at 10 MVA.

d. Node 57, a voltage drop of 10% can be expected at Montford Point.

e. Node 60, a voltage drop of 15% can be expected at Midway Park.

Case 10L-77 (Regimental 1 Load on Regimental 3 Feeder)

In the event that Main Breaker 2 is out, a switch can be closed between nodes 28-22 on Main Service Road near Holcomb Circle to put Regimental 1 load on to Regimental 3 feeder. Computor calculations were obtained using a peak demand factor of forty-one percent for Regimental 1 feeder and fifty-four percent for Regimental 3 feeder. The crucial points for this temporary arrangement are listed below:

a. Nodes 20-21, a load of 10.4 MVA can be expected on #4/0 CU top circuit Regimental 3 along Holcomb Boulevard which is rated at 10.3 MVA.

b. Nodes 30-25-26-33, a 6% voltage drop can be expected on Regimental 1 loads.

Case 11L-77 (Montford Point Load on Hospital Feeder)

In the event that Main Breaker 1 is out, switches can be closed at nodes 42-41, 41-58, 58-47; switches opened at nodes 2-46 to put Montford Point load on to Hospital feeder. Computor calculations were obtained using a peak demand factor of thirty-three percent for Montford Point and fifty-seven percent for the Hospital feeder. The crucial points are listed below:

a. Nodes 2-107, a load of 8.7 MVA can be expected on #336.4 ACSR Hospital span which is rated at 11.4 MVA.

Case 12L-77 (Total French Creek Load on #2/0 AL Feeder Tap)

The system is operated under normal situations with the exception that node 70 French Creek tap is open and total FTC load is put on new #2/0 AL tap off node 66. Computor calculations were based on a peak demand factor of fifty-five percent for French Creek feeder. The crucial points are listed below:

a. Nodes 11-66, a load of 5.8 MVA can be expected on #2/0 AL tap which is rated at 5.8 MVA.

Case 13L-77 (Hospital Load on Montford Point Feeder)

In the event that Main Breaker 10 is out, switches can be closed between nodes 41-42, to put Hospital load onto Montford Point feeder. Computer calculations were obtained using a peak demand factor of fifty-seven percent for the hospital and thirty-three percent for the Montford feeder. The crucial points are listed below:

a. Nodes 47-58, a load of 4.8 MVA can be expected on #1/0 section which is rated at 6.6 MVA.

b. Nodes 46-108, a load of 7.77 MVA can be expected on #4/0 section which is rated at 10.3 MVA.

Case 14L-77 (System Operated as a Loop)

A special case was run looping together:

a. Looping French Creek, Rifle Range, Industrial, Regimental 1, Regimental 2, and Regimental 3 Feeders.

b. Another Loop was made for Paradise Point, Capehart, and Montford Point Feeders.

c. The New Hospital Feeder was maintained as an independent feeder.

Computer calculations were obtained under these conditions with satisfactory results. No low voltage or overloaded conditions were found to exist.

SECTION 10

RELAYS

Section 11 lists and identifies all relays, relay settings, CT ratios and modifications. It is the intent of this section to explain those changes that involve more than readjustments.

To provide coordination, increased reliability and stability of the power system, it will be necessary to replace several additional relays and instantaneous elements besides the six new sets of relays being provided with new oil circuit breakers on Phase II of P574 currently being designed under A & E Contract No. 62370-77-C-4732.

The following additions to above contract are outlined to be included in contract changes as follows:

a. Replace existing relays, Paradise Point Feeder Breaker No. 7 located at Cross Street.

b. Replace existing relays on Rifle Range feeder, Breaker No. 39 located at Onslow Beach.

c. Replace existing relays on Montford Point feeder, Breaker No. 42 located at Camp No. 2.

d. Replace existing instantaneous element on Regimental 1, Main Substation, Breaker No. 2. Phase relays with elements having a range of 10-80 are needed to coordinate.

e. All new relays provided should be of the solid state design with characteristics compatable with a GE type IAC-77. The name of a manufacturer who can provide a solid state device is included on the next several pages.

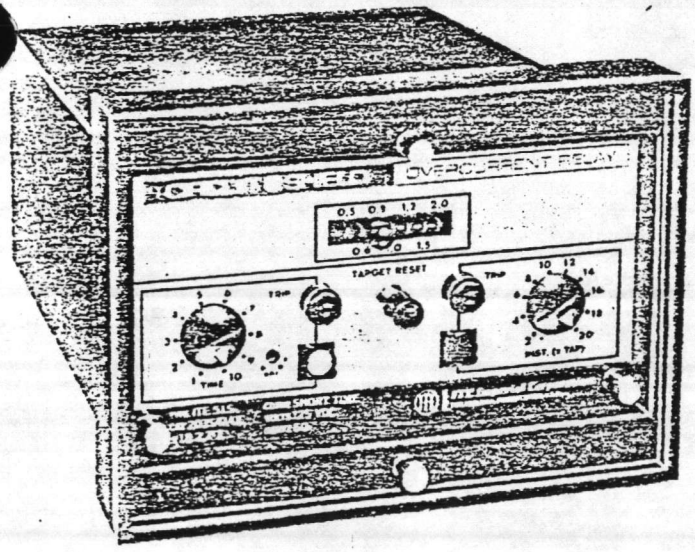
SOLID-STATE OVERCURRENT RELAYS

INSTRUCTIONS

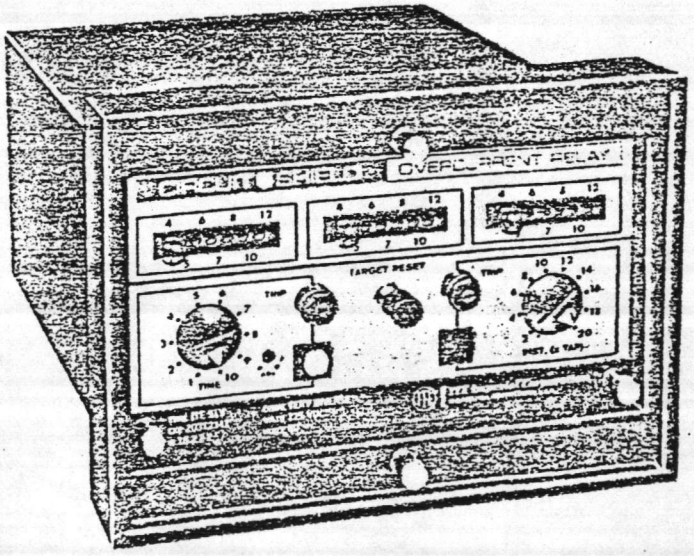
ITE Protective Relays

DRAWOUT SEMI-FLUSH MOUNTED
SINGLE-PHASE AND THREE-PHASE RELAYS

INVERSE	ITE-51I	SHORT TIME	ITE-51S
VERY INVERSE	ITE-51Y	LONG TIME	ITE-51L
EXTREMELY INVERSE	ITE-51E	DEFINITE TIME	ITE-51D
INSTANTANEOUS	ITE-50	LONG TIME INVERSE	ITE-51IM
INVERSE INSTANTANEOUS	ITE-50I	LONG TIME VERY INVERSE	ITE-51YM



SINGLE PHASE
FOR RESIDUAL GROUND PROTECTION



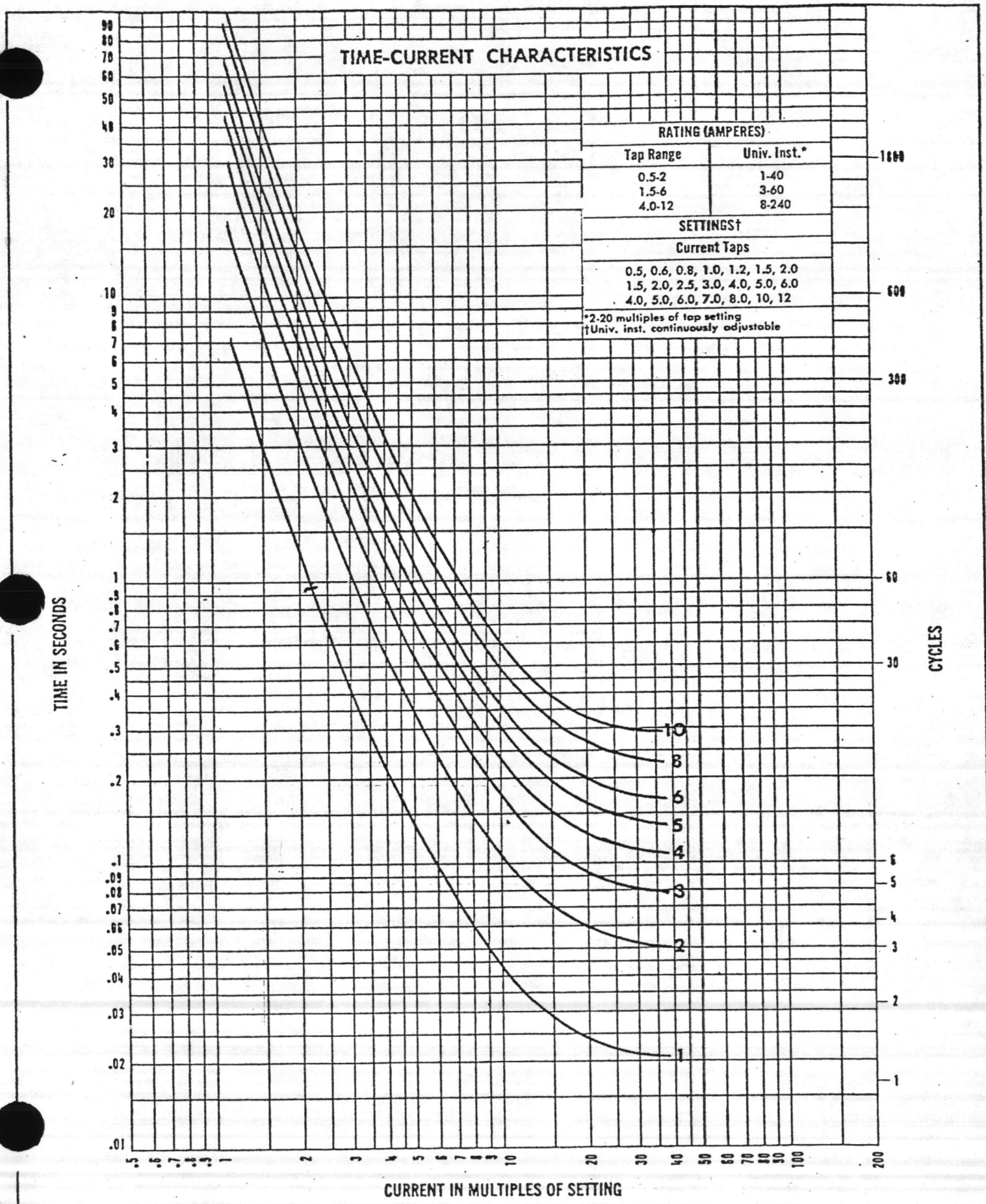
THREE PHASE
FOR PHASE PROTECTION

GOULD

ITE Protective Relay Index With Competitive Types

Device Number	Function	ITE	GE	W	Catalog Section
25	Synchronism Check	ITE-25S ITE-25V	IJS-51 IJS-52D	CVE CVE-1	18.3
27	Undervoltage Inverse Time Delay Instantaneous with Built-in Timer Instantaneous	 ITE-27 ITE-27D ITE-27H	 IAV — NGV	 CV — SV, SVF	18.4
27/59	Under and Overvoltage Inverse Time Delay Instantaneous with Built-in Timer Instantaneous	 ITE-27/59 ITE-27/59D ITE-27/59H	 IAV — CFV,NGV	 CV — SV,SVF-1	18.4
32	Phase Directional Reverse Power Over/Under Power	ITE-32 ITE-32R ITE-32W ②	CAP,CCP ICW CFW	H-3 CRN-1 CW	18.8
32N	Ground Directional Dual Polarized Negative Sequence Polarized	 ITE-32D ITE-32Q	 CFPP —	 — —	18.8
40	Loss of Excitation	—	CEH	KLF	—
46	Current Balance Negative-Sequence Time OC Negative-Sequence OC, High-Speed	ITE-46D ITE-46Q ② ITE-46H	IJC INC,SGC —	CM COQ POQ	18.6
47	U.V. and Phase Sequence Inverse Time Delay High Speed Instantaneous with Built-in Timer	 ITE-47 ITE-47H ITE-47D	 ICR CFV —	 CP,CVQ — —	18.4
49	Thermal Overcurrent Temperature	ITE-49 ITE-49T	TMC IRT	BL-1 DT-3	18.7
49/50/51	Motor Protection: overload, locked rotor and instantaneous	ITE-49	—	—	18.7
50	Instantaneous OC Inverse Instantaneous OC High Dropout Inst. OC High Dropout Inst. OC with Timer	ITE-50 ITE-50I ITE-50H ITE-50D	PJC — — —	SC,ITH — KO-3 —	18.2
50/51 51 50/51N 51N	Time Overcurrent Inverse Very Inverse Extremely Inverse Short Time Definite Time Fast Curve Long Time, Inverse with overload alarm with timer (inrush) Long Time, Very Inverse Long Time, Extremely Inverse Distribution Circuits	 ITE-51I ITE-51Y ITE-51E ITE-51S ITE-51D ITE-51SP ITE-51IM ITE-51+50D ITE-51 ③ ITE-51YM ITE-51L ITE-51+50D	 IAC-51 IAC-53 IAC-77 IAC-55 — — IAC-66A,B IAC-66K IAC-66M — — IAC-66T	 CO-7 CO-9 CO-11 CO-2 CO-6 — CO-5 COM-5 COM-5w/t — — CO-4	18.2

SOLID-STATE OVERCURRENT RELAYS



TYPE ITE 51E EXTREMELY INVERSE

ITE Imperial CORPORATION

TCC-605803

SECTION 11

TABLE OF RECOMMENDED RELAY SETTINGS

4-7350

111:JWK
11300

0 2 OCT 1981

MEMORANDUM FOR CODE 05

Subj: Relay Settings for New Hospital Feeder Breaker, Marine Corps Base, Camp Lejeune

Ref: (a) FONECON OICC/ROICC JAXNCA CAMP LEJEUNE (Mr. A. Young)/ LANTNAVFACENGCOM (Mr. A. J. Hansen) of 28 Sep 1981

1. In accordance with reference (a), corrected relay settings for new hospital circuit breaker at the main substation are as follows:

CT 500/5

IAC - 77

50/51 Relays	50/51 N Relays
TAP 6	TAP 0.5
TD 2	TD 3
IT 10	IT 10

J. W. KELLEY
Electrical Engineer
Code 111

Blind copy:
OICC/ROICC JAXNCA CAMP LEJEUNE (A. Young)
111
11B
11S

KELLEY
kwasny
30 Sep 81
nrs
DOC#0219L

4-7350

111:JWK
11300

0 2 OCT 1981

MEMORANDUM FOR CODE 05

Subj: Relay Settings for New Hospital Feeder Breaker, Marine Corps Base, Camp Lejeune

Ref: (a) FONECON OICC/ROICC JAXNCA CAMP LEJEUNE (Mr. A. Young)/ LANTNAVFACENGCOM (Mr. A. J. Hansen) of 28 Sep 1981

1. In accordance with reference (a), corrected relay settings for new hospital circuit breaker at the main substation are as follows:

CT 500/5

IAC - 77

50/51 Relays	50/51 N Relays
TAP 6	TAP 0.5
TD 2	TD 3
IT 10	IT 10

J. W. KELLEY
Electrical Engineer
Code 111

Blind copy:
OICC/ROICC JAXNCA CAMP LEJEUNE (A. Young)
111
11B
11S

KELLEY
kwasny
30 Sep 81
nrs
DOC#0219L

444-4864

11B:AJH

30 JUL 1981

MEMORANDUM FOR CODE 05

Subj: Relay settings for New Hospital Feeder Breaker, Marine Corp Base (MCB) Camp Lejeune

1. Relay settings for new hospital circuit breaker at the main substation are as follows:

CT 600/5

IAC - 77

50/51 Relays	15/51 N Relays
TAP 5	TAP 0.5
TD 2	TD 3
IT 10	IT 5 10

A. J. HANSEN
General Engineer
(Code 11B)

Blind copy to:
OICC/ROICC JACKSONVILLE (A. Y.)
11S
11B

Hansen
Carroll
7/20/81

RIFLE RANGE FDR

RELAY SETTINGS

JUN 1978

PHASE RELAYS

OCB NO.	CIRCUIT VOLTAGE (KV)	LOCATION	TYPE RELAY	QUAN.	RECOMMENDED SETTINGS TAP/RANGE	TIME DIAL	INST./RANGE	RATIO CT	REMARKS
BKR 3	12.47	Main Sub	IAC-77	3	4/4-16	5	40/10-40	600/5	Recloser Relays 0,60,120
BKR 44	12.47	Snead Ferry Rd	IAC-77	3	4/1.5-12	4	30/10-40	400/5	Recloser 0,15,30
BKR 39	12.47	Onslow Beach	IAC-77	3	8/1.5-12	1	15/10-40	100/5	Recloser 0,10,20
BKR 43	12.47	Courthouse Bay	IAC-77	3	5/1.5-12	1	40/10-40	300/5	Instantaneous will not function, Recloser 0,30,60
BKR 40	12.47	Rifle Range	IAC-77	3	4/1.5-12	1	25/10-40	50/5	Recloser 0,10,20

RIFLE RANGE FDR

RELAY SETTINGS

JUN 1978

GROUND RELAYS

OCB NO.	CIRCUIT VOLTAGE (KV)	LOCATION	TYPE RELAY	QUAN.	RECOMMENDED SETTINGS TAP/RANGE	TIME DIAL	INST./RANGE	RATIO CT	REMARKS
BKR 3	12.47	Main Sub	IAC-77	1	1/.5-4	4	15/10-40	600/5	
BKR 44	12.47	Snead Ferry RD.	IAC-77	1	.5/.5-2	5	8/2-16	400/5	
BKR 39	12.47	Onslow Beach	IAC-77	1	.5/.5-2	.5	.5/.5-4	100/5	
BKR 43	12.47	Courthouse Bay	IAC-77	1	.5/5-2	2	4/2-16	300/5	
BKR 40	12.47	Rifle Range	IAC-77	1	.5/.5-2	1	2/.5-4	50/5	

RELAY SETTINGS

FRENCH CREEK FDR JUN 1978 0 RELAYS

OCB NO.	CIRCUIT VOLTAGE (KV)	LOCATION	TYPE RELAY	QUAN.	RECOMMENDED SETTINGS TAP/RANGE	TIME DIAL	INST./RANGE	RATIO CT	REMARKS
BK5	12.47	Main Sub	CO-9	3	6/1-12	4	60/6-144	600/5	Recloser Relays 0,25,50

FRENCH CREEK FDR

RELAY SETTINGS

JUN 1978

GROUND RELAYS

OCB NO.	CIRCUIT VOLTAGE (KV)	LOCATION	TYPE RELAY	QUAN.	RECOMMENDED SETTINGS TAP/RANGE	TIME DIAL	INST./RANGE	RATIO CT	REMARKS
BKR 5	12.47	Main Sub	CO-8	1	.5/.5-2.5	5	6/6-144	600/5	

RELAY SETTINGS

INDUSTRIAL FDR JUN 1978 Ø RELAY

OCB NO.	CIRCUIT VOLTAGE (KV)	LOCATION	TYPE RELAY	QUAN.	RECOMMENDED SETTINGS TAP/RANGE	TIME DIAL	INST./RANGE	RATIO CT	REMARKS
BK 7	12.47	Main Sub	CO-9	3	4/1-12	1	20/6-144	600/5	Recloser Relay 0,10,20

INDUSTRIAL FDR

RELAY SETTINGS

JUN 1978

GROUND RELAY

OCB NO.	CIRCUIT VOLTAGE (KV)	LOCATION	TYPE RELAY	QUAN.	RECOMMENDED SETTINGS TAP/RANGE	TIME DIAL	INST./RANGE	RATIO CT	REMARKS
BK 7	12.47	Main Sub	CO-8	1	.5/.5-2.5	1	2/6-144	600/5	

RELAY SETTINGS

JUN 1978

REGIMENTAL 2 Ø RELAY

OCB NO.	CIRCUIT VOLTAGE (KV)	LOCATION	TYPE RELAY	QUAN.	RECOMMENDED SETTINGS TAP/RANGE	TIME DIAL	INST./RANGE	RATIO CT	REMARKS
BK 8	12.47	Main Sub	IAC-77	3	5/4-16	9	30/10-40 *	600/5	Recloser Relay 0,40,80
BK 35	12.47	Louis & Main Ser. Rd.	IAC-51	3	5/4-16	2	35/20-80	200/5	Recloser 0,10,20
BK 36	12.47	Louis & Main Ser. Rd.	IAC-51	3	5/4-16	2	35/20-80	200/5	Recloser 0,10,20
BK 37	12.47	Louis & Main Ser. Rd.	IAC-51	3	5/4-16	5	10/20-80	300/5	Recloser 0,10,20

*OCB #8 cannot pick up all of inrush at one time on this circuit with the French Creek circuit load connect to Regimental #2

* Instantaneous on OCB 37 and 8 may not coordinate

RELAY SETTINGS

JUN 1978

REGIMENTAL 2 FDR

GROUND RELAY

OCB NO.	CIRCUIT VOLTAGE (KV)	LOCATION	TYPE RELAY	QUAN.	RECOMMENDED SETTINGS TAP/RANGE	TIME DIAL	INST./RANGE	RATIO CT	REMARKS
BK 8	12.47	Main Sub	IAC-77	1	.5/.5-4	6	15/10-80	600/5	
BK 35	12.47	Louis & Main Ser. Rd.	IAC-51	1	.5/.5-2	4	10/10-40	200/5	
BK 36	12.47	Louis & Main Ser. Rd.	IAC-51	1	.5/.5-2	4	10/10-40	200/5	
BK 37	12.47	Louis & Main Ser. Rd.	IAC-51	1	.5/.5-2	5	10/10-40	300/5	

REGIMENTAL 1 FDR

RELAY SETTINGS
JUN 1978

Ø RELAY

OCB NO.	CIRCUIT VOLTAGE (KV)	LOCATION	TYPE RELAY	QUAN.	RECOMMENDED SETTINGS TAP/RANGE	TIME DIAL	INST./RANGE	RATIO CT	REMARKS
BK 2	12.47	Main Sub	IAC-77	3	5/4-16	4	50/10-40	600/5	Recloser 0,60,120 need new range of 10-80 instantaneous
BK 41	12.47	Dare Dr.	IAC-51	3	5/4-16	1	20/20-80	400/5	Recloser 0,10,20
BK 33	12.47	Dare Dr. & Main Ser. Rd.	IAC-51	3	5/4-16	1	20/20-80	600/5	Recloser, 0,10,20
BK 34	12.47	Dare Dr. & Main Ser. Rd.	IAC-51	3	5/4-16	2	20/20-80	200/5	Recloser 0,10,20
BK (NEW)	12.47	"A" St.	~~IAC-77~~ CO-11	3	~~5/4-16~~ 4/4-12	1/2	~~20/20-80~~ 30/6-144	~~400~~ 300/5	Recloser 0,10,20
BK 8	12.47	"A" St.	IAC-51	3	5/4-16	1	20/20-80	400/5	Recloser 0,10,20

RELAY SETTINGS

REGIMENTAL 1 FDR

JUN 1978

GROUND RELAY

OCB NO.	CIRCUIT VOLTAGE (KV)	LOCATION	TYPE RELAY	QUAN.	RECOMMENDED SETTINGS TAP/RANGE	TIME DIAL	INST./RANGE	RATIO CT	REMARKS
FDR BK 2 MAIN SUB	12.47	Main Sub	IAC-77	1	1/.5-4	10	20/10-80	600/5	
BK 41	12.47	Dare Dr.	IAC-51	1	.5/.5-2	1/2	10/10-40	400/5	
BK 33	12.47	Dare Dr. & Main Ser. Rd.	IAC-51	1	.5/.5-2	1/2	10/10-40	600/5	
BK 34	12.47	Dare Dr. & Main Ser. Rd.	IAC-51	1	.5/.5-2	1/2	10/10-40	200/5	
BK (NEW)	12.47	"A" St.	~~IAC 51~~ CO-11	1	.5/.5-2.5	1/2	10/~~10-40~~ 2-48	~~400~~/5 300	
BK 8	12.47	"A" St.	IAC-51	1	.5/.5-2	1/2	10/10-40	400/5	

RELAY SETTINGS

REGIMENTAL 3 FDR

JUN 1978

Ø RELAY

OCB NO.	CIRCUIT VOLTAGE (KV)	LOCATION	TYPE RELAY	QUAN.	RECOMMENDED SETTINGS TAP/RANGE	TIME DIAL	INST./RANGE	RATIO CT	REMARKS
BK 9	12.47	Main Sub	IAC-77	3	4/4-16	3	15/10-40 *	600/5	Recloser 0,10,20

* OCB #9 cannot pick-up all of unrust at one time on this circuit with Regimental #1 or Regimental #2 circuit load connected to Regimental #3

RELAY SETTINGS

REGIMENTAL 3 JUN 1978 GROUND RELAY

OCB NO.	CIRCUIT VOLTAGE (KV)	LOCATION	TYPE RELAY	QUAN.	RECOMMENDED SETTINGS TAP/RANGE	TIME DIAL	INST./RANGE	RATIO CT	REMARKS
BK 9	12.47	Main Sub	IAC-77	1	.5/.5-4	1	10/10-80	600/5	

RELAY SETTINGS

PARDISE POINT FDR — JUN 1978 — Ø RELAY

OCB NO.	CIRCUIT VOLTAGE (KV)	LOCATION	TYPE RELAY	QUAN.	RECOMMENDED SETTINGS TAP/RANGE	TIME DIAL	INST./RANGE	RATIO CT	REMARKS
BK 4	12.47	Main Sub	CO-9	3	5/1-12	4	50/6-144	600/5	Recloser settings 0,15,30
BK 7	12.47	Cross St.	IAC-77	3	4/4-16	1/2	20/20-80	400/5	Recloser setting 0,10,20 Need new relays
BK 18	12.47	BOQ Area	CO-9	3	5/4-12	3	40/10-40	200/5	Recloser settings 0,10,20
BK 11	12.47	BOQ Area	IAC-77	3	5/1.5-12	3	40/10-40	200/5	Recloser settings 0,10,20
PARDISE AT HOSPITAL	2.4KV	#1, #2,	IAC-77	3	5/1.5-12	1	10/10-40	400/5	RECLOSERS TURNED OFF
		#3	IAC-77	3	5/1.5-12	8	10/10-40	400/5	" " "

RELAY SETTINGS

PARADISE POINT FDR — JUN 1978 — GROUND RELAY

OCB NO.	CIRCUIT VOLTAGE (KV)	LOCATION	TYPE RELAY	QUAN.	RECOMMENDED SETTINGS TAP/RANGE	TIME DIAL	INST./RANGE	RATIO CT	REMARKS
BK 4	12.47	Main Sub	CO-8	1	1/.5-2.5	5	10/6-144	600/5	
BK 7	12.47	Cross St.	IAC-77	1	.5/.5-2	1/2	10/~~10-40~~ 2-16	400/5	Need new relays
BK 18	12.47	BOQ Area	CO-9	1	.5/.5-2.5	1/2	10/10-40	200/5	
BK 11	12.47	BOQ Area	IAC-77	1	.5/.5-2	1/2	10/2-16	200/5	
HOSPITAL	2,4	1,2,3	IAC-77	1	.5/.5-2	1	2/2-16	400/5	

RELAY SETTINGS

CAPEHART FDR

JUN 1978

Ø RELAY

OCB NO.	CIRCUIT VOLTAGE (KV)	LOCATION	TYPE RELAY	QUAN.	RECOMMENDED SETTINGS TAP/RANGE	TIME DIAL	INST./RANGE	RATIO CT	REMARKS
BK 6 (AIR)	12.47	Main Sub	IAC-77	3	5/4-16	3	30/10-40	600/5	Recloser Relay 0,20,40
BK 13 (AIR)	12.47	Capehart Sub	CO-6	3	5/4-12	3		300/5	Recloser Relay 0,15,30
BK 14 (AIR)	12.47	Capehart Sub	CO-6	3					Spare
BK 15 (AIR)	12.47	Capehart Sub	CO-8	3	5/2-6	1	30/10-40	200/5	Recloser Relay 0,10,20
BK 16 (AIR)	12.47	Capehart Sub	CO-8	3	5/2-6	1	30/10-40	200/5	Recloser Relay 0,10,20
BK 17	12.47	Capehart Sub	CO-8	3	5/2-6	1	30/10-40	200/5	Recloser Relay 0,10,20

RELAY SETTINGS

CAPEHART FDR — JUN 1978 — GROUND RELAY

OCB NO.	CIRCUIT VOLTAGE (KV)	LOCATION	TYPE RELAY	QUAN.	RECOMMENDED SETTINGS TAP/RANGE	TIME DIAL	INST./RANGE	RATIO CT	REMARKS
BK6	12.47	Main Sub	IAC-77	1	.5/.5-4	3	10/10-80	600/5	

RELAY SETTINGS

MONTFORD FDR JUN 1978 Ø RELAY

OCB NO.	CIRCUIT VOLTAGE (KV)	LOCATION	TYPE RELAY	QUAN.	RECOMMENDED SETTINGS TAP/RANGE	TIME DIAL	INST./RANGE	RATIO CT	REMARKS
BK 1	12.47	Main Sub	IAC-77	3	6/4-16	2	40/10-40 *	600/5	Recloser Relays 0,15,30
New BK 31	12.47	Camp 1&2&3	IAC-77	3	4/1.5-12	1	15/10-40	200/5	Recloser Relays 0,10,20

* OCB #1 Cannot pick-up all of inrush at one time on this circuit with Paradise Point circuit load connect to monford feeder

RELAY SETTINGS

JUN 1978

MONTFORD FDR

GROUND RELAYS

OCB NO.	CIRCUIT VOLTAGE (KV)	LOCATION	TYPE RELAY	QUAN.	RECOMMENDED SETTINGS TAP/RANGE	TIME DIAL	INST./RANGE	RATIO CT	REMARKS
BK 1	12.47	Main Sub	IAC-77	1	.5/.5-4	4	10/10-80	600/5	
NEW BK 31	12.47	Camp 1&2&3	IAC-77	1	.5/.5-2	1	1.5/.5-4	200/5	

RELAY SETTINGS
JUN 1978

HOSPITAL FDR

Ø RELAYS

OCB NO.	CIRCUIT VOLTAGE (KV)	LOCATION	TYPE RELAY	QUAN.	RECOMMENDED SETTINGS TAP/RANGE	TIME DIAL	INST./RANGE	RATIO CT	REMARKS
BK 10	12.47	Main Sub	IAC-77	3	5/4-16	2	40/10-40	600/5	Recloser Relay 0,10,20

RELAY SETTINGS

JUN 1978

HOSPITAL FDR

GROUND RELAY

OCB NO.	CIRCUIT VOLTAGE (KV)	LOCATION	TYPE RELAY	QUAN.	RECOMMENDED SETTINGS TAP/RANGE	TIME DIAL	INST./RANGE	RATIO CT	REMARKS
BK 10	12.47	Main Sub	IAC-77	1	.5/.5-4	3	5/2-16	600/5	

SECTION 12

SCOPE OF WORK-RELAY TESTING

The following is a scope of work for a contract for

1. Testing and calibration of all electric protective devices.

2. Inspection and testing of circuit breakers.

Furnish all engineering services necessary to perform

1. The testing and calibration of all electric protective devices, and

2. Inspection and testing of all power circuit breakers in the main substation at Camp Lejeune.

The service shall include the following:

1. Testing and calibration of all relays using the manufacturer's suggested testing and calibration procedures;

2. Cleaning all relays;

3. Checking for proper polarity, phase rotation and phase angle;

4. Checking all control circuitry to assure that the equipment is performing in accordance with its design intentions. Breaker test tripping will be accomplished where possible;

5. Inspect all circuit breakers for proper mechanical and electrical operation. Check all mechanical parts, linkages, assembly, etc. Check all electric components for defects, wear, etc.

5. A report on all testing, calibration and findings shall be submitted.

The services hereunder shall include the necessary field surveys, site investigations and all travel and subsistence and ten (10) copies of the completed report.

RELAYS

TYPE AND STYLE

NUMBER OF RELAYS	TYPE	STYLE	MANUFACTURER

Firms that can accomplish the work are:

Maryland Electrical Testing Co., Inc.
3100 Washington Boulevard
Baltimore, Maryland 21230

Telephone: (301) 644-6100

Westinghouse Electric Corp.
Electric Service Division
1055 Taylor Avenue
Tawson, Maryland 21204

Telephone: (301) 828-5400

SECTION 13

GENERAL DISCUSSION AND RECOMMENDATIONS

CAPACITORS

As indicated in Section 7, the voltage drop in some areas of the Station exceeds 5% of the normal bus voltage. The voltage drop is excessive and will cause problems. It is recommended that capacitors be installed on the feeder/feeders with the excessive voltage drop. The capacitor banks should be operated as unswitched banks (no automatic switching).

The following additions and changes to P574 under A & E Contract N62370-77-C-4732 are to be included as follows:

1. Add unswitched capacitors (1400 KVAR) at Courthouse Bay area.

2. Add unswitched capacitors (225 KVAR) at Duncan Street tap.

3. Add unswitched capacitors (150 KVAR) at end of Duncan Street.

4. Add unswitched capacitors (600 KVAR) at Onslow Beach.

5. Add unswitched capacitors (150 KVAR) at Rifle Range area.

6. Add bank of unswitched capacitors (2400 KVAR) required at FTC area.

7. Add bank of unswitched capacitors (1600 KVAR) on primary of French Creek regulator.

8. Add another bank of capacitors (2400 KVAR) at Capehart housing area.

The following capacitors are recommended and should be included as part of project P-600 new hospital construction scheduled for FY 79 as follows:

1. Add unswitched capacitors (500 KVAR) Montford Point Camp 1-3.

2. Add unswitched capacitors (2200 KVAR) at new hospital load area.

The following capacitors are recommended and should be included as part of P-243 (BEQ Construction). Air conditioners are to be relocated at BA-104 and BA-105. These are existing buildings located at Onslow Beach area.

1. One bank of unswitched capacitors rated at 140 KVAR should be installed on a pole close to the new air conditioning load.

VOLTAGE REGULATORS

Future load increases due to planned projects for Courthouse Bay area and the Rifle Range area have made it necessary to recommend adding one new 600 KVA voltage regulator at Marines Road and Sneads Ferry Road intersection. Regulators are to be three phase type.

A voltage drop exceeding 5% was identified by the computor analysis and relocation of an existing 500 KVA voltage regulator was considered to correct this problem. However, relocation of this regulator is not recommended at this time because Camp Knox Trailer Park is currently being phased out.

One new 1500 KVA voltage regulator has been recommended for the purpose of regulating the Montford Point feeder so that it may be used as alternative feeder to support the new hospital. The location has been identified as near as possible to intersection of Brewster Street and Holcomb Boulevard. Funding will be handled under Project P600 new hospital construction scheduled for FY 79.

One new 75 KVA voltage regulator is recommended to be installed under P-243 at Breaker 39 to correct voltage drop conditions at Onslow Beach.

CIRCUIT BREAKER AND RELAY INSPECTION AND TESTING

It is recommended that the protective relays and oil circuit breakers in the system be inspected and tested. This should not be accomplished until the new relays are installed (Sections 10 & 11). The scope of work, and names and addresses of two firms that can accomplish the inspection and testing, are given in Section 12. The scope of work should also list the type, manufacturer and number of relays and circuit breakers.

The scope of work including the type, manufacturer and number of relays and circuit breakers should be submitted to the two firms for a cost estimate.

RIFLE RANGE FEEDER

It is recommended that futher projects causing electrical load increases on the Rifle Range feeder be discouraged. This feeder is 27 miles long with most of the load concentrated at the Courthouse Bay area which is some 21 miles from the main substation. Four voltage regulators in series, are now needed to overcome the low voltage drop conditions.

In the event that any large power increases become necessary (anything above 500 KVA) consideration should be given to either changing over to 34.5 KV, adding a second feeder using proposed new feeder routing as shown on one-line diagram (Section 15), or possibly picking up a second point of service from the REA line at the far end of the Rifle Range feeder, and splitting the load at Courthouse Bay area.

RECLOSERS

1. A new recloser is recommended for the French Creek Feeder. Installation should be provided under P-574 Phase II. Coordination for this recloser was based upon a McGraw Edison Recloser type RX with 400 amp continuous rating, 6000 amp interrupting capacity, and 225 amp trip coil which has a minimum trip of 450 amps. Recloser was set to trip once on instantaneous (Curve A) and twice on long delay (Curve D).

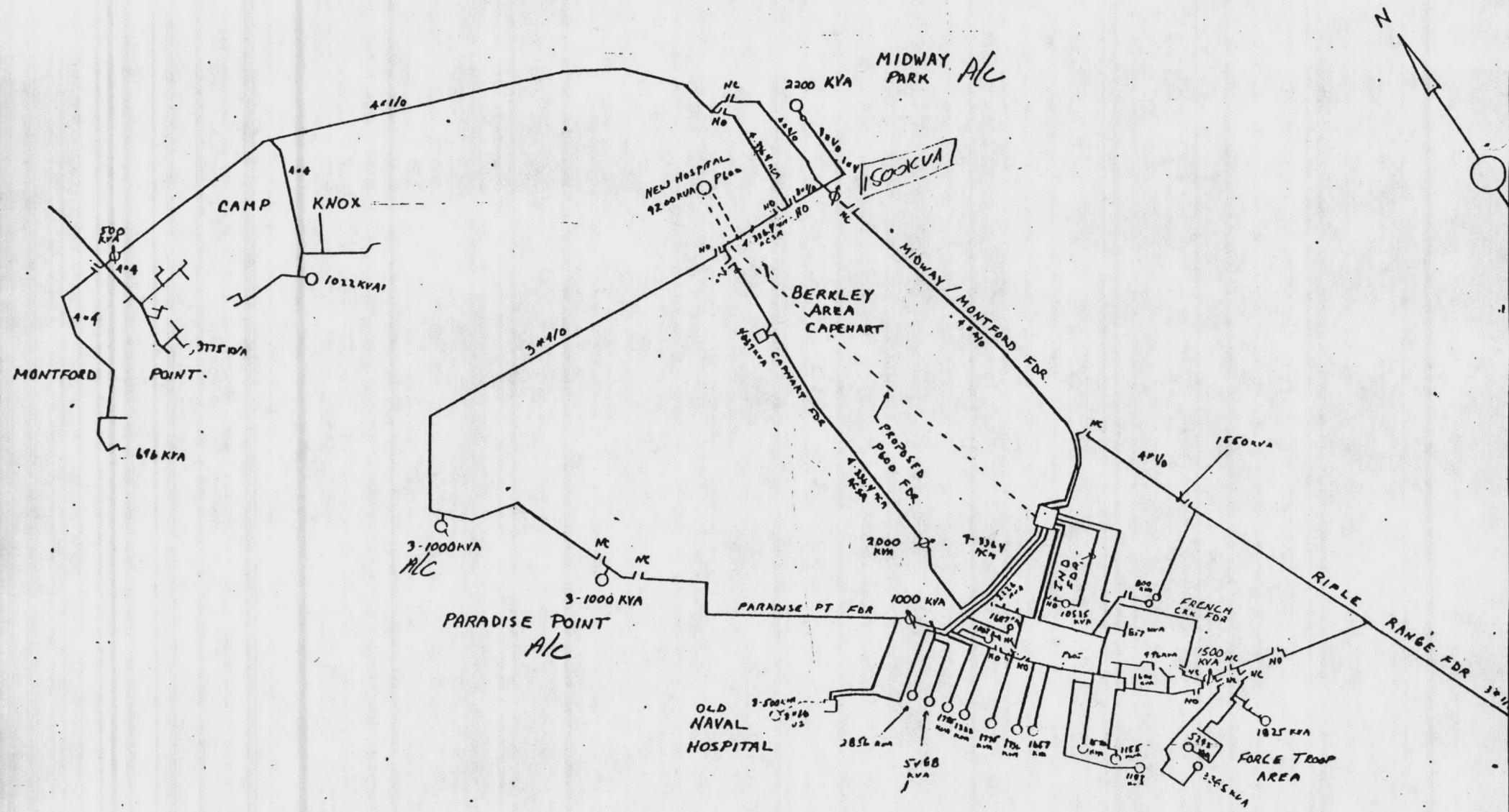
2. It is recommended that existing recloser at Midway Park be left in place. Coordination for this recloser was based upon a McGraw Edison Recloser type RX with 400 amp continuous rating, 6000 amp interrupting capacity, and 50 amp trip coil which has a minimum trip of 100 amp. Recloser was set to trip once on instantaneous (Curve A) and twice on long delay (Curve B). Modification may be required on existing recloser to provide above operation.

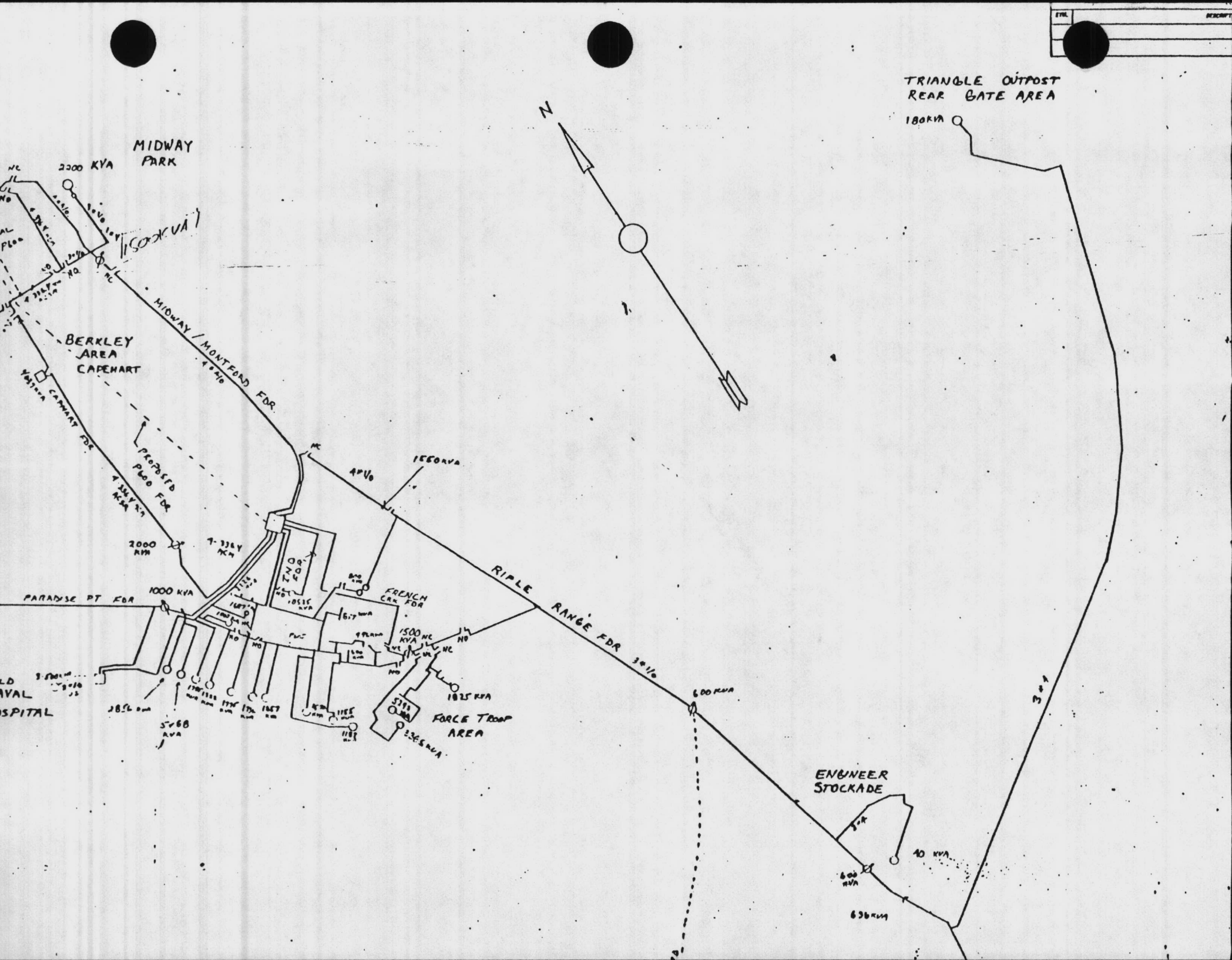
SECTION 15

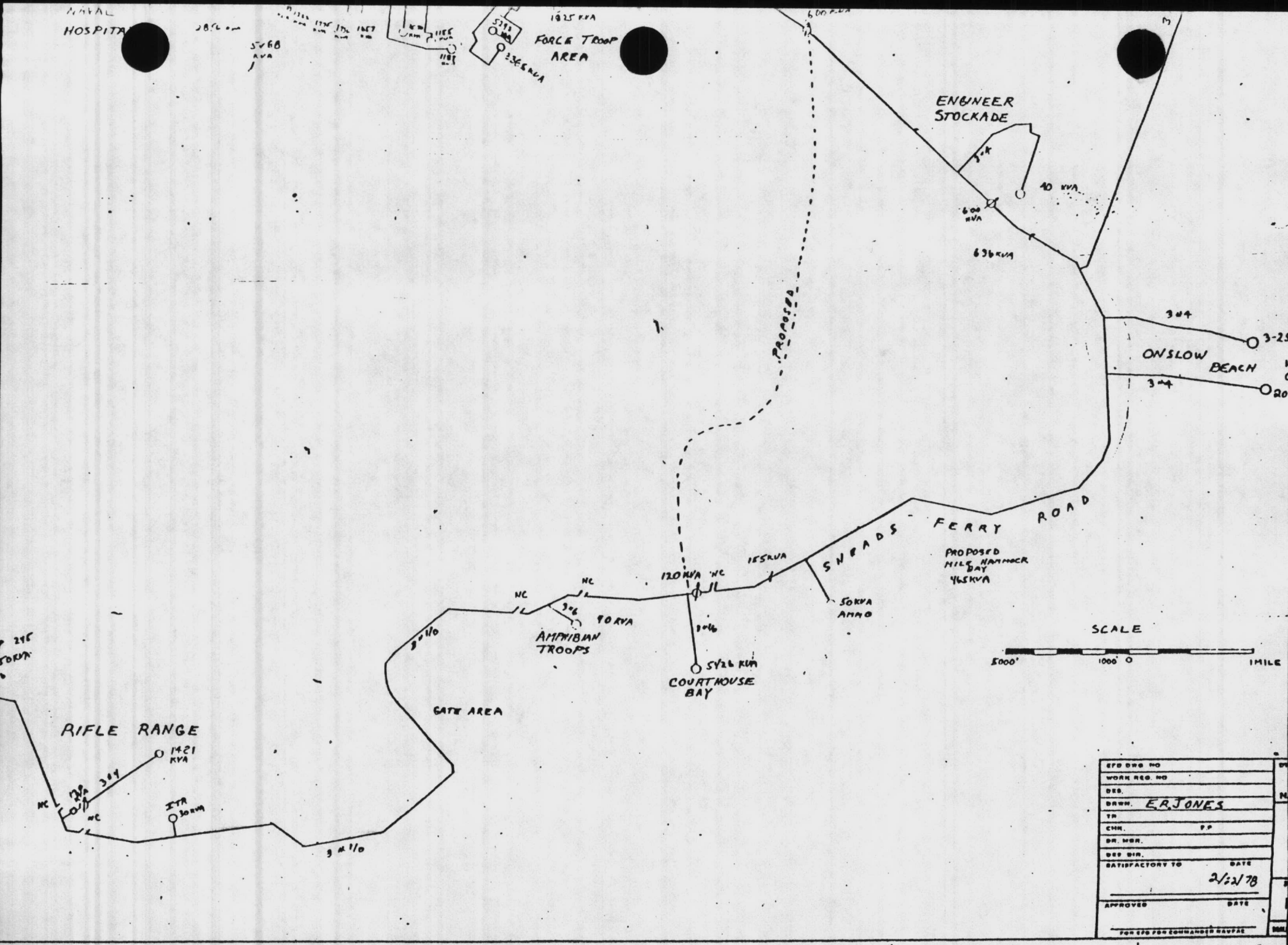
ONE-LINE DIAGRAM

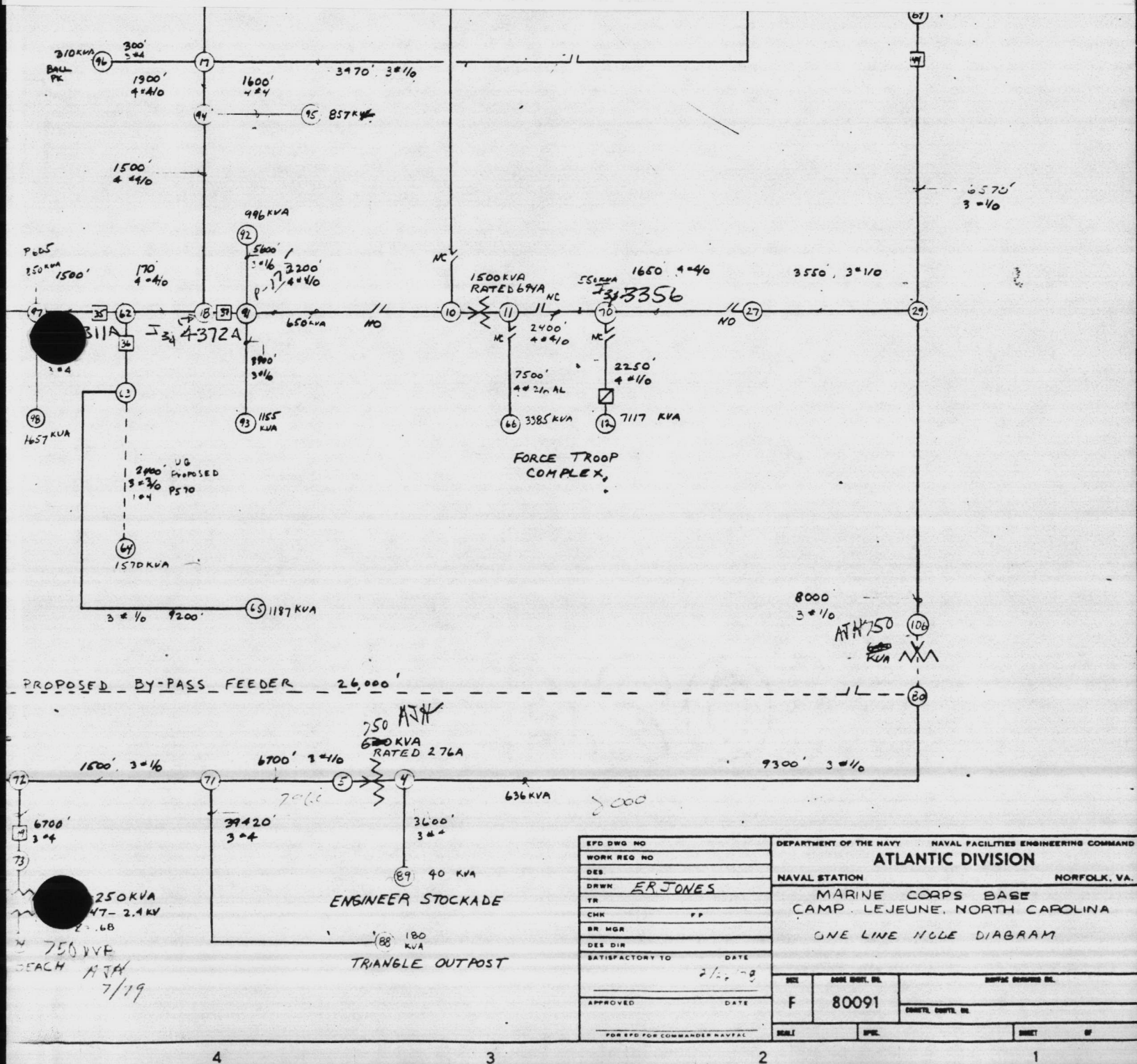
SECTION 14

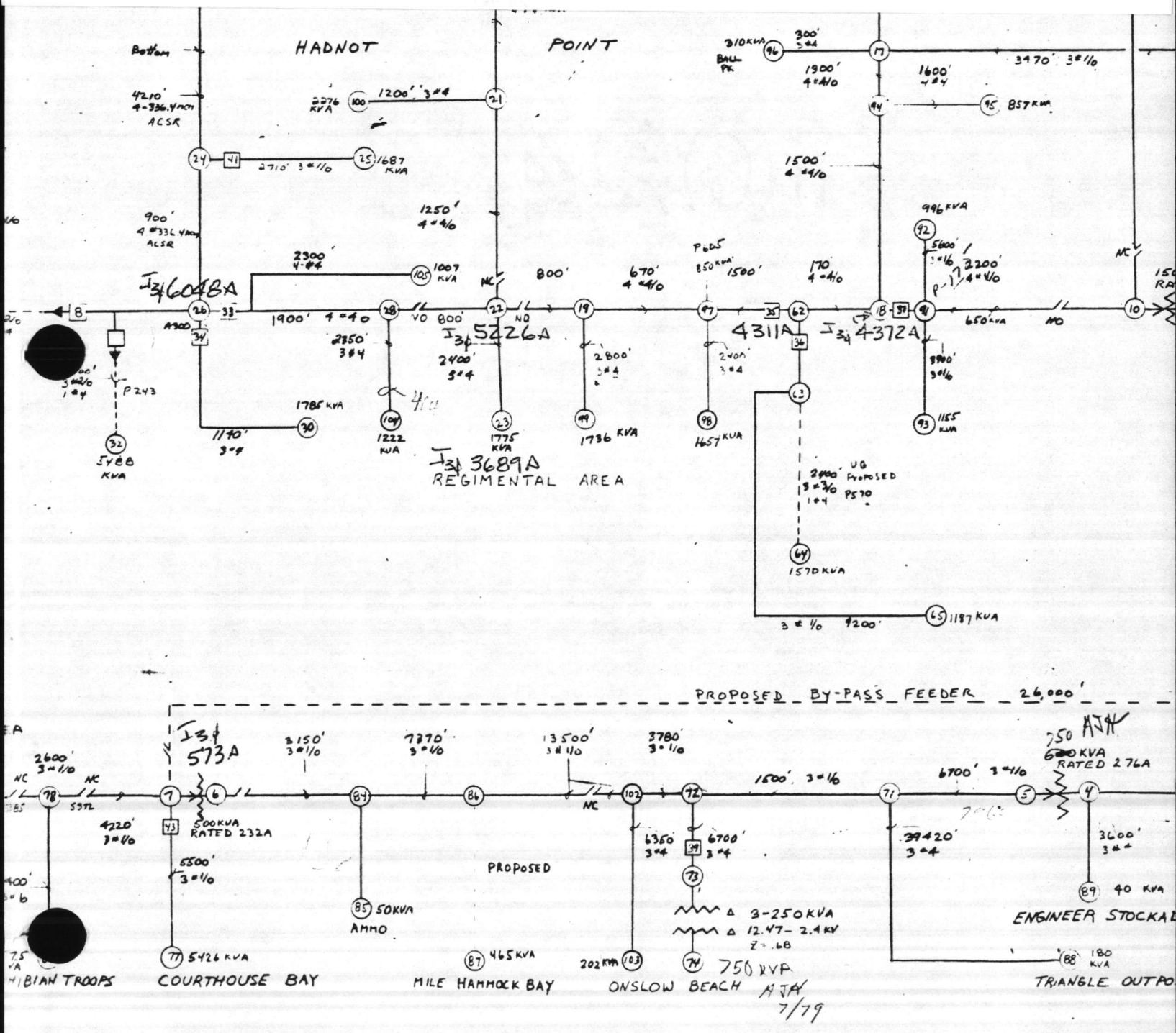
BUS-NODE DIAGRAM


MIDWAY PARK A/C
2200 KVA
4#1/0
CAMP KNOX
1022 KVA
3775 KVA
MONTFORD POINT
696 KVA
NEW HOSPITAL PLOT
9200 KVA
1500 KVA
MIDWAY / MONTFORD FDR
BERKLEY AREA CAPEHART
CAPEHART FDR
PROPOSED PLOT FDR
3#4/0
3-1000 KVA A/C
3-1000 KVA
PARADISE POINT A/C
PARADISE PT FDR
2000 KVA
1000 KVA
1550 KVA
RIFLE RANGE FDR
FRENCH CRK FDR
1500 KVA
1825 KVA
FORCE TROOP AREA
OLD NAVAL HOSPITAL
5768 KVA
N

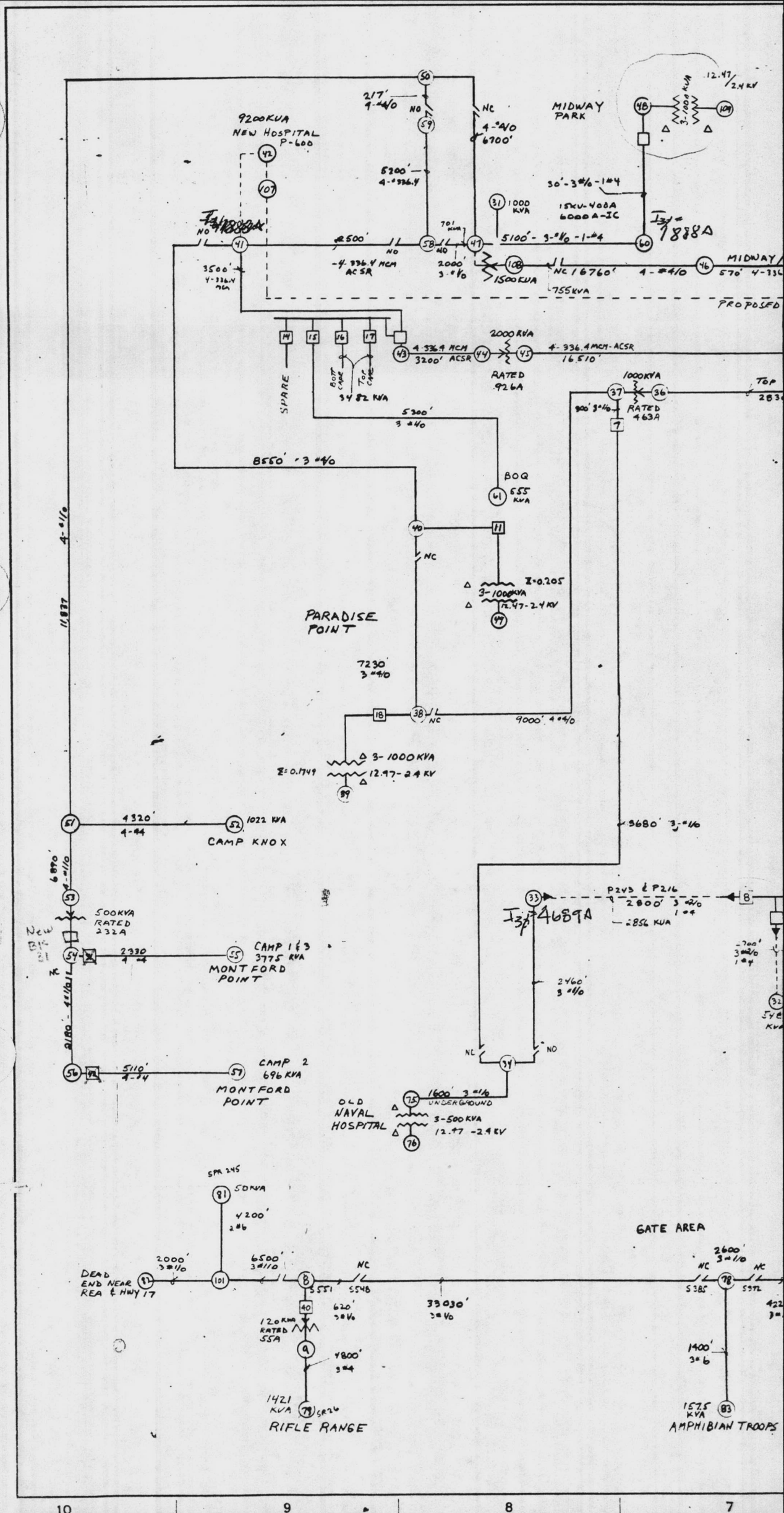

TRIANGLE OUTPOST
REAR GATE AREA
180KVA
N
MIDWAY
PARK
2200 KVA
1150KVA
MIDWAY / MONTFORD FDR.
BERKLEY
AREA
CAPEHART
CAPHART FDR
PROPOSED
PLOO FDR
2000
KVA
1000 KVA
PARADISE PT FDR
1660KVA
RIFLE RANGE FDR
FRENCH
CRK FDR
1500
KVA
1825 KVA
FORCE TROOP
AREA
600 KVA
ENGINEER
STOCKADE
40 KVA
600
KVA
636KVA
3#4


NAVAL HOSPITAL
FORCE TROOP AREA
1825 KVA
ENGINEER STOCKADE
40 KVA
600 KVA
636 KVA
PROPOSED
ONSLOW BEACH
SNEADS FERRY ROAD
PROPOSED MILL HAMMOCK BAY
465 KVA
165 KVA
120 KVA
NC
50 KVA AMMO
90 KVA
AMPHIBIAN TROOPS
COURTHOUSE BAY
GATE AREA
RIFLE RANGE
1421 KVA
SCALE
5000'
1000' 0
1 MILE
EFD DWG NO
WORK REQ. NO
DES.
DRAWN. E.R. JONES
TR
CHK.
DR. MGR.
DES DIR.
SATISFACTORY TO
DATE
2/22/78
APPROVED
DATE
FOR EFD FOR COMMANDER NAVFAC


310KVA
BALL PK
300' 3#4
1900' 4#4/0
1600' 4#4
3470' 3#1/0
857KVA
1500' 4#4/0
996KVA
5600' 3#1/6
3200' 4#4/0
170' 4#4/0
1500' 3#4
650KVA
NO
1500KVA RATED 694A
NC
55KVA
1650' 4#4/0
3550' 3#1/0
2400' 4#4/0
7500' 4# 2/0 AL
2250' 4#1/0
3385KVA
7117 KVA
1155 KVA
1657KVA
2000' UG PROPOSED 3#3/0 1#4 P570
1570KVA
1187KVA
9200' 3#1/0
6570' 3#1/0
8000' 3#1/0
KVA
FORCE TROOP COMPLEX
PROPOSED BY-PASS FEEDER 26,000'
750 KVA RATED 276A
1500' 3#1/0
6700' 3#1/0
9300' 3#1/0
636KVA
6700' 3#4
39420' 3#4
3600' 3#4
40 KVA
ENGINEER STOCKADE
250KVA
2.4KV - .68
750 KVA EACH
180 KVA
TRIANGLE OUTPOST
EFD DWG NO
WORK REQ NO
DES
DRWN ER JONES
TR
CHK FP
BR MGR
DES DIR
SATISFACTORY TO DATE
APPROVED DATE
FOR EFD FOR COMMANDER NAVFAC
DEPARTMENT OF THE NAVY NAVAL FACILITIES ENGINEERING COMMAND
ATLANTIC DIVISION
NAVAL STATION NORFOLK, VA.
MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA
ONE LINE NODE DIAGRAM
SIZE F
CODE IDENT. NO. 80091
SCALE
SHEET OF


HADNOT POINT
Bottom
4210' 4-336.4 MCM ACSR
2276 KVA
1200' 3#4
1687 KVA
2710' 3#1/0
900' 4#336.4 MCM ACSR
1250' 4#4/0
2300' 4#4
1007 KVA
J3 4604BA
1900' 4#4/0
2350' 3#4
J3 5226A
2400' 3#4
800'
670' 4#4/0
2800' 3#4
1775 KVA
1736 KVA
1785 KVA
1222 KVA
1140' 3#4
5488 KVA
P243
310 KVA
BALL PK
300' 3#4
1900' 4#4/0
1600' 4#4
3470' 3#1/0
857 KVA
1500' 4#4/0
996 KVA
5600' 3#6
2200' 4#4/0
170' 4#4/0
1500'
850 KVA
4311A
J3 4372A
650 KVA
1155 KVA
1657 KVA
2400' 3#4
2400' 3#3/0 1#4 UG PROPOSED PS70
1570 KVA
1187 KVA
3#1/0 9200'
PROPOSED BY-PASS FEEDER 26,000'
J3 573A
2600' 3#1/0
3150' 3#1/0
7370' 3#4/0
13500' 3#1/0
3780' 3#1/0
1600' 3#1/0
6700' 3#1/0
750 KVA RATED 276A
4220' 3#1/0
500 KVA RATED 232A
6500' 3#1/0
PROPOSED
6360' 3#4
6700' 3#4
39420' 3#4
3600' 3#4
50 KVA AMMO
3-250 KVA
12.47-2.4 KV
Z = .68
40 KVA
ENGINEER STOCKA
5426 KVA
465 KVA
202 KVA
750 KVA
180 KVA
BIAN TROOPS
COURTHOUSE BAY
MILE HAMMOCK BAY
ONSLOW BEACH
TRIANGLE OUTPO
7/79

7 6 5 4


9200KVA
NEW HOSPITAL
P-600
MIDWAY PARK
12.47/2.4 KV
3-1000 KVA
217'
4-#4/0
NO
NC
4-#4/0
6700'
5200'
4-#336.4
30'-3#1/0-1#4
1000 KVA
15KV-400A
6000A-IC
I3φ = 1888A
2500'
-4-336.4 MCM ACSR
2000'
3-#1/0
1500KVA
NC 16760'
4-#4/0
570' 4-336
MIDWAY
PROPOSED
3500'
4-336.4 MCM
SPARE
BOT CAPE
TOP CAPE
3482 KVA
4-336.4 MCM
3200' ACSR
2000 KVA
RATED 926A
4-336.4MCM-ACSR
16,510'
1000KVA
RATED 463A
TOP
5300'
3-#4/0
8550' 3-#4/0
BOQ
555 KVA
Z=0.205
3-1000KVA
12.47-2.4 KV
PARADISE POINT
7230'
3-#4/0
9000' 4-#4/0
Z=0.1749
3-1000KVA
12.47-2.4 KV
4320'
4-#4
1022 KVA
CAMP KNOX
3680' 3-#1/0
6870'
4-#1/0
500KVA
RATED 232A
New Bk 21
2330'
4-#4
CAMP 1 & 3
3775 KVA
MONTFORD POINT
2180' - 4-#1/0
5110'
4-#4
CAMP 2
696 KVA
MONTFORD POINT
P213 & P216
2800' 3-#2/0
1-#4
856 KVA
I3φ = 4689A
2460'
3-#2/0
1600' 3-#1/0
UNDERGROUND
OLD NAVAL HOSPITAL
3-500 KVA
12.47-2.4 KV
SPA 245
50KVA
4200'
2-#6
GATE AREA
2000'
3-#1/0
6500'
3-#1/0
DEAD END NEAR REA & HWY 17
5551'
5548
33,030'
3-#1/0
620'
3-#1/0
120 KVA
RATED 55A
4800'
3-#4
1421 KVA
SPA 26
RIFLE RANGE
2600'
3-#1/0
5385
5372
1400'
3-#6
157.5 KVA
AMPHIBIAN TROOPS

10 | 9 | 8 | 7

NEW TITLE ----- LOAD FLOW FOR CAMP LEJEUNE ELECTRICAL DISTRIBUTION SYSTEM: CASE P-7700000200

WITH PROPOSED SYSTEM CHANGES AND IMPROVEMENTS. 00000220

BASE CASE LINE AND TRANSFORMER DATA

TYPE	ACTION	FROM BUS	TO BUS	CKT/A	R	X	MVAC	TAP	TMIN	TMAX	SHIFT	C-BUS	RATINGS		BSMVA
0	ADDITION	2	3	0 F	0.18	0.41	0.0	0.0	0.0	0.0	0.0	0	11.	0.	10.0
0	ADDITION	3	67	0 F	5.45	7.19	0.0	0.0	0.0	0.0	0.0	0	7.	0.	10.0
0	ADDITION	67	69	0 F	0.66	0.87	0.0	0.0	0.0	0.0	0.0	0	7.	0.	10.0
0	ADDITION	67	68	0 F	2.04	2.70	0.0	0.0	0.0	0.0	0.0	0	7.	0.	10.0
0	ADDITION	69	29	0 F	4.45	5.87	0.0	0.0	0.0	0.0	0.0	0	7.	0.	10.0
0	ADDITION	29	106	0 F	5.42	7.15	0.0	0.0	0.0	0.0	0.0	0	7.	0.	10.0
0	ADDITION	106	80	0 F	0.0	14.00	0.0	1.000	0.900	1.100	0.0	80	6.	0.	10.0
0	ADDITION	80	4	0 F	6.30	8.32	0.0	0.0	0.0	0.0	0.0	0	7.	0.	10.0
0	ADDITION	4	89	0 F	6.10	3.45	0.0	0.0	0.0	0.0	0.0	0	4.	0.	10.0
0	ADDITION	4	5	0 F	0.0	14.00	0.0	0.910	0.910	0.910	0.0	5	6.	0.	10.0
0	ADDITION	5	71	0 F	4.54	5.99	0.0	0.0	0.0	0.0	0.0	0	7.	0.	10.0
0	ADDITION	71	88	0 F	66.85	37.83	0.0	0.0	0.0	0.0	0.0	0	4.	0.	10.0
0	ADDITION	71	72	0 F	1.01	1.34	0.0	0.0	0.0	0.0	0.0	0	7.	0.	10.0
0	ADDITION	72	73	0 F	11.36	6.42	0.0	0.0	0.0	0.0	0.0	0	4.	0.	10.0
0	ADDITION	72	102	0 F	2.56	3.38	0.0	0.0	0.0	0.0	0.0	0	7.	0.	10.0
0	ADDITION	102	103	0 F	10.76	6.09	0.0	0.0	0.0	0.0	0.0	0	4.	0.	10.0
0	ADDITION	102	66	0 F	9.15	12.08	0.0	0.0	0.0	0.0	0.0	0	7.	0.	10.0
0	ADDITION	86	84	0 F	4.99	6.59	0.0	0.0	0.0	0.0	0.0	0	7.	0.	10.0
0	ADDITION	84	6	0 F	2.13	2.81	0.0	0.0	0.0	0.0	0.0	0	7.	0.	10.0
0	ADDITION	6	7	0 F	0.0	14.00	0.0	0.900	0.900	0.900	0.0	7	5.	0.	10.0
0	ADDITION	7	77	0 F	3.72	4.92	0.0	0.0	0.0	0.0	0.0	0	7.	0.	10.0
0	ADDITION	7	78	0 F	2.86	3.77	0.0	0.0	0.0	0.0	0.0	0	7.	0.	10.0
0	ADDITION	78	8	0 F	22.37	29.53	0.0	0.0	0.0	0.0	0.0	0	7.	0.	10.0
0	ADDITION	8	9	0 F	0.0	58.33	0.0	0.975	0.975	0.975	0.0	9	1.	0.	10.0
0	ADDITION	9	79	0 F	8.14	4.60	0.0	0.0	0.0	0.0	0.0	0	4.	0.	10.0
0	ADDITION	2	10	0 F	3.30	7.54	0.0	0.0	0.0	0.0	0.0	0	11.	0.	10.0
0	ADDITION	10	11	0 F	0.0	4.66	0.0	1.000	0.900	1.100	0.0	11	15.	0.	10.0
0	ADDITION	11	66	0 F	0.12	0.11	0.0	0.0	0.0	0.0	0.0	0	6.	0.	10.0
0	ADDITION	11	70	0 F	0.81	1.98	0.0	0.0	0.0	0.0	0.0	0	10.	0.	10.0
0	ADDITION	70	12	0 F	1.52	2.01	0.0	0.0	0.0	0.0	0.0	0	7.	0.	10.0
0	ADDITION	70	27	0 F	0.56	1.36	0.0	0.0	0.0	0.0	0.0	0	10.	0.	10.0
0	ADDITION	2	13	0 F	0.14	0.32	0.0	0.0	0.0	0.0	0.0	0	11.	0.	10.0
0	ADDITION	13	14	0 F	3.83	5.01	0.0	0.0	0.0	0.0	0.0	0	7.	0.	10.0
0	ADDITION	2	15	0 F	0.15	0.34	0.0	0.0	0.0	0.0	0.0	0	11.	0.	10.0
0	ADDITION	15	16	0 F	0.87	2.14	0.0	0.0	0.0	0.0	0.0	0	10.	0.	10.0
0	ADDITION	16	17	0 F	0.74	1.82	0.0	0.0	0.0	0.0	0.0	0	10.	0.	10.0
0	ADDITION	17	96	0 F	0.88	1.16	0.0	0.0	0.0	0.0	0.0	0	4.	0.	10.0
0	ADDITION	17	90	0 F	2.35	3.10	0.0	0.0	0.0	0.0	0.0	0	7.	0.	10.0
0	ADDITION	17	94	0 F	0.44	1.07	0.0	0.0	0.0	0.0	0.0	0	10.	0.	10.0
0	ADDITION	94	18	0 F	0.50	1.24	0.0	0.0	0.0	0.0	0.0	0	10.	0.	10.0
0	ADDITION	18	91	0 F	0.01	0.01	0.0	0.0	0.0	0.0	0.0	0	10.	0.	10.0
0	ADDITION	91	92	0 F	3.79	5.01	0.0	0.0	0.0	0.0	0.0	0	7.	0.	10.0
0	ADDITION	91	93	0 F	2.64	3.49	0.0	0.0	0.0	0.0	0.0	0	7.	0.	10.0
0	ADDITION	18	62	0 F	0.05	0.14	0.0	0.0	0.0	0.0	0.0	0	10.	0.	10.0
0	ADDITION	62	63	0 F	0.06	0.08	0.0	0.0	0.0	0.0	0.0	0	10.	0.	10.0
0	ADDITION	63	64	0 F	1.26	1.40	0.0	0.0	0.0	0.0	0.0	0	7.	0.	10.0
0	ADDITION	63	65	0 F	6.23	8.23	0.0	0.0	0.0	0.0	0.0	0	7.	0.	10.0
0	ADDITION	62	97	0 F	0.50	1.24	0.0	0.0	0.0	0.0	0.0	0	10.	0.	10.0
0	ADDITION	97	98	0 F	4.07	2.30	0.0	0.0	0.0	0.0	0.0	0	4.	0.	10.0

BASE CASE LINE AND TRANSFORMER DATA

TYPE	ACTION	FROM BUS	TO BUS	CKT/A	R	X	MVAC	TAP	TMIN	TMAX	SHIFT	C-BUS	RATINGS		BSMVA
0	ADDITION	97	19	0 F	0.22	0.55	0.0	0.0	0.0	0.0	0.0	0	10.	0.	10.0
0	ADDITION	19	99	0 F	4.74	2.68	0.0	0.0	0.0	0.0	0.0	0	4.	0.	10.0
0	ADDITION	2	20	0 F	0.15	0.34	0.0	0.0	0.0	0.0	0.0	0	11.	0.	10.0
0	ADDITION	20	21	0 F	1.47	3.63	0.0	0.0	0.0	0.0	0.0	0	10.	0.	10.0
0	ADDITION	21	100	0 F	2.03	1.15	0.0	0.0	0.0	0.0	0.0	0	4.	0.	10.0
0	ADDITION	21	22	0 F	0.42	1.03	0.0	0.0	0.0	0.0	0.0	0	10.	0.	10.0
0	ADDITION	22	23	0 F	4.07	2.30	0.0	0.0	0.0	0.0	0.0	0	4.	0.	10.0
0	ADDITION	2	24	0 F	1.42	3.15	0.0	0.0	0.0	0.0	0.0	0	11.	0.	10.0
0	ADDITION	24	25	0 F	2.42	1.83	0.0	0.0	0.0	0.0	0.0	0	7.	0.	10.0
0	ADDITION	24	26	0 F	0.30	0.69	0.0	0.0	0.0	0.0	0.0	0	11.	0.	10.0
0	ADDITION	26	28	0 F	0.64	1.57	0.0	0.0	0.0	0.0	0.0	0	10.	0.	10.0
0	ADDITION	28	104	0 F	3.98	2.25	0.0	0.0	0.0	0.0	0.0	0	4.	0.	10.0
0	ADDITION	26	105	0 F	3.95	2.23	0.0	0.0	0.0	0.0	0.0	0	4.	0.	10.0
0	ADDITION	26	30	0 F	1.93	1.09	0.0	0.0	0.0	0.0	0.0	0	4.	0.	10.0
0	ADDITION	26	32	0 F	1.78	1.62	0.0	0.0	0.0	0.0	0.0	0	6.	0.	10.0
0	ADDITION	26	33	0 F	1.84	1.68	0.0	0.0	0.0	0.0	0.0	0	6.	0.	10.0
0	ADDITION	2	35	0 F	1.36	2.66	0.0	0.0	0.0	0.0	0.0	0	11.	0.	10.0
0	ADDITION	35	36	0 F	0.96	2.36	0.0	0.0	0.0	0.0	0.0	0	10.	0.	10.0
0	ADDITION	36	37	0 F	0.0	7.00	0.0	1.000	0.900	1.100	0.0	37	10.	0.	10.0
0	ADDITION	37	34	0 F	2.49	3.29	0.0	0.0	0.0	0.0	0.0	0	7.	0.	10.0
0	ADDITION	34	75	0 F	1.20	0.39	0.0	0.0	0.0	0.0	0.0	0	5.	0.	10.0
0	ADDITION	37	38	0 F	3.05	7.51	0.0	0.0	0.0	0.0	0.0	0	10.	0.	10.0
0	ADDITION	38	40	0 F	2.45	6.03	0.0	0.0	0.0	0.0	0.0	0	10.	0.	10.0
0	ADDITION	2	45	0 F	5.59	12.75	0.0	0.0	0.0	0.0	0.0	0	11.	0.	10.0
0	ADDITION	45	44	0 F	0.0	3.50	0.0	1.000	0.900	1.100	0.0	44	20.	0.	10.0
0	ADDITION	44	43	0 F	1.08	2.48	0.0	0.0	0.0	0.0	0.0	0	11.	0.	10.0
0	ADDITION	43	41	0 F	1.18	2.72	0.0	0.0	0.0	0.0	0.0	0	11.	0.	10.0
0	ADDITION	43	61	0 F	3.59	4.70	0.0	0.0	0.0	0.0	0.0	0	7.	0.	10.0
0	ADDITION	2	46	0 F	0.19	0.44	0.0	0.0	0.0	0.0	0.0	0	11.	0.	10.0
0	ADDITION	46	108	0 F	5.69	13.99	0.0	0.0	0.0	0.0	0.0	0	10.	0.	10.0
0	ADDITION	108	47	0 F	0.0	4.66	0.0	1.000	0.900	1.100	0.0	47	15.	0.	10.0
0	ADDITION	47	31	0 F	0.01	0.01	0.0	0.0	0.0	0.0	0.0	0	7.	0.	10.0
0	ADDITION	47	60	0 F	3.45	4.56	0.0	0.0	0.0	0.0	0.0	0	7.	0.	10.0
0	ADDITION	60	48	0 F	0.02	0.02	0.0	0.0	0.0	0.0	0.0	0	7.	0.	10.0
0	ADDITION	47	50	0 F	2.27	5.59	0.0	0.0	0.0	0.0	0.0	0	10.	0.	10.0
0	ADDITION	50	51	0 F	8.02	10.59	0.0	0.0	0.0	0.0	0.0	0	7.	0.	10.0
0	ADDITION	51	52	0 F	7.32	4.14	0.0	0.0	0.0	0.0	0.0	0	4.	0.	10.0
0	ADDITION	51	53	0 F	4.67	6.16	0.0	0.0	0.0	0.0	0.0	0	4.	0.	10.0
0	ADDITION	53	54	0 F	0.0	14.00	0.0	1.000	0.900	1.100	0.0	54	5.	0.	10.0
0	ADDITION	54	55	0 F	3.95	2.23	0.0	0.0	0.0	0.0	0.0	0	4.	0.	10.0
0	ADDITION	54	56	0 F	1.47	1.95	0.0	0.0	0.0	0.0	0.0	0	7.	0.	10.0
0	ADDITION	56	57	0 F	8.66	4.90	0.0	0.0	0.0	0.0	0.0	0	4.	0.	10.0
0	ADDITION	84	85	0 F	10.76	6.09	0.0	0.0	0.0	0.0	0.0	0	4.	0.	10.0
0	ADDITION	78	83	0 F	3.78	1.39	0.0	0.0	0.0	0.0	0.0	0	3.	0.	10.0
0	ADDITION	8	101	0 F	8.14	4.60	0.0	0.0	0.0	0.0	0.0	0	4.	0.	10.0
0	ADDITION	101	81	0 F	0.75	0.49	0.0	0.0	0.0	0.0	0.0	0	3.	0.	10.0
0	ADDITION	101	82	0 F	1.35	1.78	0.0	0.0	0.0	0.0	0.0	0	4.	0.	10.0
0	ADDITION	94	95	0 F	2.71	1.53	0.0	0.0	0.0	0.0	0.0	0	4.	0.	10.0
0	ADDITION	2	107	0 F	7.85	17.95	0.0	0.0	0.0	0.0	0.0	0	11.	0.	10.0

BASE CASE LINE AND TRANSFORMER DATA

TYPE	ACTION	FROM BUS	TO BUS	CKT/A	R	X	MVAC	TAP	TMIN	TMAX	SHIFT	C-BUS	RATINGS		BSMVA
0	ADDITION	187	43	0 F	0.22	0.55	0.0	0.0	0.0	0.0	0.0	0	10.	0.	10.0
0	ADDITION	42	98	0 F	0.74	0.68	0.0	0.000	0.000	0.000	0.0	42	15.	0.	10.0
0	ADDITION	9949	0	0 F	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	10.	0.	10.0
0	ADDITION	2	20	0 F	0.15	0.34	0.0								
0	ADDITION	20	21	0 F	1.47	3.63	0.0	0.0	0.0	0.0	0.0	0	10.	0.	10.0
0	ADDITION	21	100	0 F	2.03	1.15	0.0	0.0	0.0	0.0	0.0	0	4.	0.	10.0
0	ADDITION	21	22	0 F	0.42	1.03	0.0	0.0	0.0	0.0	0.0	0	10.	0.	10.0
0	ADDITION	22	23	0 F	4.07	2.30	0.0	0.0	0.0	0.0	0.0	0	4.	0.	10.0
0	ADDITION	2	24	0 F	1.42	3.15	0.0	0.0	0.0	0.0	0.0	0	11.	0.	10.0
0	ADDITION	24	25	0 F	2.42	1.83	0.0	0.0	0.0	0.0	0.0	0	7.	0.	10.0
0	ADDITION	24	26	0 F	0.30	0.69	0.0	0.0	0.0	0.0	0.0	0	11.	0.	10.0
0	ADDITION	26	28	0 F	0.64	1.57	0.0	0.0	0.0	0.0	0.0	0	10.	0.	10.0
0	ADDITION	28	104	0 F	3.28	2.25	0.0	0.0	0.0	0.0	0.0	0	4.	0.	10.0
0	ADDITION	26	105	0 F	3.95	2.23	0.0	0.0	0.0	0.0	0.0	0	4.	0.	10.0
0	ADDITION	26	30	0 F	1.23	1.09	0.0	0.0	0.0	0.0	0.0	0	4.	0.	10.0
0	ADDITION	26	32	0 F	1.78	1.62	0.0	0.0	0.0	0.0	0.0	0	6.	0.	10.0
0	ADDITION	26	33	0 F	1.84	1.68	0.0	0.0	0.0	0.0	0.0	0	4.	0.	10.0
0	ADDITION	2	35	0 F	1.35	2.66	0.0	0.0	0.0	0.0	0.0	0	11.	0.	10.0
0	ADDITION	35	36	0 F	0.96	2.36	0.0	0.0	0.0	0.0	0.0	0	10.	0.	10.0
0	ADDITION	36	37	0 F	0.0	7.00	0.0	1.000	0.900	1.100	0.0	37	10.	0.	10.0
0	ADDITION	37	34	0 F	2.49	3.29	0.0	0.0	0.0	0.0	0.0	0	7.	0.	10.0
0	ADDITION	34	75	0 F	1.20	0.39	0.0	0.0	0.0	0.0	0.0	0	5.	0.	10.0
0	ADDITION	37	38	0 F	3.05	7.51	0.0	0.0	0.0	0.0	0.0	0	10.	0.	10.0
0	ADDITION	38	40	0 F	2.85	6.03	0.0	0.0	0.0	0.0	0.0	0	10.	0.	10.0
0	ADDITION	2	45	0 F	5.59	12.75	0.0	0.0	0.0	0.0	0.0	0	11.	0.	10.0
0	ADDITION	45	44	0 F	0.0	3.50	0.0	1.000	0.900	1.100	0.0	44	20.	0.	10.0
0	ADDITION	44	43	0 F	1.08	2.48	0.0	0.0	0.0	0.0	0.0	0	11.	0.	10.0
0	ADDITION	43	41	0 F	1.18	2.72	0.0	0.0	0.0	0.0	0.0	0	11.	0.	10.0
0	ADDITION	43	61	0 F	3.59	8.70	0.0	0.0	0.0	0.0	0.0	0	7.	0.	10.0
0	ADDITION	2	46	0 F	0.19	0.44	0.0	0.0	0.0	0.0	0.0	0	11.	0.	10.0
0	ADDITION	46	108	0 F	5.62	13.99	0.0	0.0	0.0	0.0	0.0	0	10.	0.	10.0
0	ADDITION	108	47	0 F	0.0	4.66	0.0	1.000	0.900	1.100	0.0	47	15.	0.	10.0
0	ADDITION	47	31	0 F	0.01	0.01	0.0	0.0	0.0	0.0	0.0	0	7.	0.	10.0
0	ADDITION	47	60	0 F	3.45	4.56	0.0	0.0	0.0	0.0	0.0	0	7.	0.	10.0
0	ADDITION	60	48	0 F	0.02	0.02	0.0	0.0	0.0	0.0	0.0	0	7.	0.	10.0
0	ADDITION	47	50	0 F	2.27	5.59	0.0	0.0	0.0	0.0	0.0	0	10.	0.	10.0
0	ADDITION	50	51	0 F	8.02	10.59	0.0	0.0	0.0	0.0	0.0	0	7.	0.	10.0
0	ADDITION	51	52	0 F	7.32	4.14	0.0	0.0	0.0	0.0	0.0	0	4.	0.	10.0
0	ADDITION	51	53	0 F	4.67	6.16	0.0	0.0	0.0	0.0	0.0	0	4.	0.	10.0
0	ADDITION	53	54	0 F	0.0	14.00	0.0	1.000	0.900	1.100	0.0	54	5.	0.	10.0
0	ADDITION	54	55	0 F	3.95	2.23	0.0	0.0	0.0	0.0	0.0	0	4.	0.	10.0
0	ADDITION	54	56	0 F	1.47	1.25	0.0	0.0	0.0	0.0	0.0	0	7.	0.	10.0
0	ADDITION	56	57	0 F	8.66	4.90	0.0	0.0	0.0	0.0	0.0	0	4.	0.	10.0
0	ADDITION	84	85	0 F	10.76	6.09	0.0	0.0	0.0	0.0	0.0	0	4.	0.	10.0
0	ADDITION	78	83	0 F	3.78	1.39	0.0	0.0	0.0	0.0	0.0	0	3.	0.	10.0
0	ADDITION	8	101	0 F	8.14	4.60	0.0	0.0	0.0	0.0	0.0	0	4.	0.	10.0
0	ADDITION	101	81	0 F	0.75	0.49	0.0	0.0	0.0	0.0	0.0	0	5.	0.	10.0
0	ADDITION	101	82	0 F	1.35	1.78	0.0	0.0	0.0	0.0	0.0	0	4.	0.	10.0
0	ADDITION	94	95	0 F	2.71	1.53	0.0	0.0	0.0	0.0	0.0	0	4.	0.	10.0
0	ADDITION	2	107	0 F	7.45	17.25	0.0	0.0	0.0	0.0	0.0	0	11.	0.	10.0

BASE CASE BUS DATA

TYPE	ACTION	BUS	NAME	REG	C-BUS	VOLTS	ANGLE	PGEN	QGEN	QMIN	QMAX	PLOAD	QLOAD	BSR	AREA
0	ADDITION	2	MAIN SUB	2	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
0	ADDITION	3	RIFLE RANGE		0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
0	ADDITION	67	RR DUNCAN ST		0	0.0	0.0	0.0	0.0	0.0	0.0	0.42	0.20	0.22	0
0	ADDITION	68	RR DEADEND		0	0.0	0.0	0.0	0.0	0.0	0.0	0.22	0.10	0.15	0
0	ADDITION	69	RR BK 44		0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
0	ADDITION	29	RR MAIN SER		0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
0	ADDITION	106	RR REG 500		0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
0	ADDITION	80	RR MARINE RD		0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
0	ADDITION	4	RR REG 600		0	0.0	0.0	0.0	0.0	0.0	0.0	0.17	0.08	0.0	0
0	ADDITION	89	RR ENGR STK		0	0.0	0.0	0.0	0.0	0.0	0.0	0.01	0.00	0.0	0
0	ADDITION	5	RR REG 600		0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
0	ADDITION	71	RR TRIANGLE		0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
0	ADDITION	88	RR TRIANGLE		0	0.0	0.0	0.0	0.0	0.0	0.0	0.05	0.02	0.0	0
0	ADDITION	72	RR BK 39		0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
0	ADDITION	73	RR BK39 LOAD		0	0.0	0.0	0.0	0.0	0.0	0.0	0.20	0.10	0.60	0
0	ADDITION	102	RR ONSLOW TP		0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
0	ADDITION	103	RR ONSLOW LD		0	0.0	0.0	0.0	0.0	0.0	0.0	0.05	0.03	0.0	0
0	ADDITION	86	RR MILE HAMM		0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
0	ADDITION	84	RR AMMO		0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
0	ADDITION	6	RR REG 500		0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
0	ADDITION	7	RR BK 43		0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
0	ADDITION	77	RR CT HOUSE		0	0.0	0.0	0.0	0.0	0.0	0.0	2.93	1.41	1.40	0
0	ADDITION	78	RR AMPHIB TP		0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
0	ADDITION	83	RR AMPHIB TP		0	0.0	0.0	0.0	0.0	0.0	0.0	0.04	0.02	0.0	0
0	ADDITION	85	RR AMMO		0	0.0	0.0	0.0	0.0	0.0	0.0	0.01	0.01	0.0	0
0	ADDITION	8	RR BK 40		0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
0	ADDITION	9	RR REG 120		0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
0	ADDITION	79	RR LOAD		0	0.0	0.0	0.0	0.0	0.0	0.0	0.38	0.0	0.0	0
0	ADDITION	101	RR SPR 245 T		0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
0	ADDITION	81	RR SPR 245		0	0.0	0.0	0.0	0.0	0.0	0.0	0.01	0.01	0.0	0
0	ADDITION	82	RR END		0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
0	ADDITION	10	FR CHK REG		0	0.0	0.0	0.0	0.0	0.0	0.0	0.06	0.03	1.60	0
0	ADDITION	11	FR CHK 2/0 T		0	0.0	0.0	0.0	0.0	0.0	0.0	0.27	0.13	0.0	0
0	ADDITION	66	FR CHK 2/0 L		0	0.0	0.0	0.0	0.0	0.0	0.0	1.67	0.80	0.0	0
0	ADDITION	70	FR CHK 1/0 T		0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
0	ADDITION	12	FR CHK 1/0 L		0	0.0	0.0	0.0	0.0	0.0	0.0	3.52	1.69	2.40	0
0	ADDITION	27	FR CHK MAIN		0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
0	ADDITION	13	IND FDR		0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
0	ADDITION	14	IND FDR LOAD		0	0.0	0.0	0.0	0.0	0.0	0.0	3.50	1.68	0.0	0
0	ADDITION	15	REG 2		0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
0	ADDITION	16	REG 2 GUM		0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
0	ADDITION	17	REG 2		0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
0	ADDITION	96	REG 2 BALL P		0	0.0	0.0	0.0	0.0	0.0	0.0	0.16	0.07	0.0	0
0	ADDITION	90	REG 2 DBL E		0	0.0	0.0	0.0	0.0	0.0	0.0	0.06	0.03	0.0	0
0	ADDITION	94	REG 2		0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
0	ADDITION	95	REG 2 LOUIS		0	0.0	0.0	0.0	0.0	0.0	0.0	0.43	0.21	0.0	0
0	ADDITION	18	REG 2 BK37		0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
0	ADDITION	91	REG 2 MAIN S		0	0.0	0.0	0.0	0.0	0.0	0.0	0.33	0.16	0.0	0
0	ADDITION	92	REG 2 SHOP A		0	0.0	0.0	0.0	0.0	0.0	0.0	0.50	0.24	0.0	0

BASE CASE BUS DATA

TYPE	ACTION	BUS	NAME	REG	C-BUS	VOLTS	ANGLE	PGEN	QGEN	QMIN	QMAX	PLOAD	QLOAD	BSR	AREA
0	ADDITION	93	REG 2 O-ST		0	0.0	0.0	0.0	0.0	0.0	0.0	0.58	0.28	0.0	0
0	ADDITION	62	REG2 BK35-36		0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
0	ADDITION	63	REG 2 L-N TP		0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
0	ADDITION	64	REG 2 N-ST		0	0.0	0.0	0.0	0.0	0.0	0.0	0.79	0.38	0.0	0
0	ADDITION	65	REG 2 L-ST		0	0.0	0.0	0.0	0.0	0.0	0.0	0.60	0.29	0.0	0
0	ADDITION	97	REG 2		0	0.0	0.0	0.0	0.0	0.0	0.0	0.45	0.21	0.0	0
0	ADDITION	98	REG 2 K-ST		0	0.0	0.0	0.0	0.0	0.0	0.0	0.85	0.40	0.0	0
0	ADDITION	19	REG 2		0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
0	ADDITION	99	REG 2 H-ST		0	0.0	0.0	0.0	0.0	0.0	0.0	0.88	0.42	0.0	0
0	ADDITION	20	REG 3		0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
0	ADDITION	21	REG 3		0	0.0	0.0	0.0	0.0	0.0	0.0	0.36	0.17	0.0	0
0	ADDITION	100	REG 3 MOLLY		0	0.0	0.0	0.0	0.0	0.0	0.0	1.11	0.53	0.0	0
0	ADDITION	22	REG 3 HOL C		0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
0	ADDITION	23	REG 3 LOAD		0	0.0	0.0	0.0	0.0	0.0	0.0	0.86	0.41	0.0	0
0	ADDITION	24	REG 1 BK 41		0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
0	ADDITION	25	REG 1 LUCY		0	0.0	0.0	0.0	0.0	0.0	0.0	0.62	0.30	0.0	0
0	ADDITION	26	REG1 BK33-34		0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
0	ADDITION	105	REG 1 POST L		0	0.0	0.0	0.0	0.0	0.0	0.0	0.37	0.18	0.0	0
0	ADDITION	28	REG 1 MAIN S		0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
0	ADDITION	104	REG 1 F-ST		0	0.0	0.0	0.0	0.0	0.0	0.0	0.45	0.22	0.0	0
0	ADDITION	30	REG 1 C-D ST		0	0.0	0.0	0.0	0.0	0.0	0.0	0.66	0.32	0.0	0
0	ADDITION	32	REG 1 NEW BK		0	0.0	0.0	0.0	0.0	0.0	0.0	2.96	1.42	0.0	0
0	ADDITION	33	REG 1 UND GD		0	0.0	0.0	0.0	0.0	0.0	0.0	1.54	0.74	0.0	0
0	ADDITION	35	PARIDISE PT		0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
0	ADDITION	36	PP REG 1000		0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
0	ADDITION	37	PP REG		0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
0	ADDITION	34	PP HOSP FDR		0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
0	ADDITION	75	PP HOSP LOAD		0	0.0	0.0	0.0	0.0	0.0	0.0	1.07	0.51	0.0	0
0	ADDITION	38	PP BK 18		0	0.0	0.0	0.0	0.0	0.0	0.0	2.15	1.02	0.0	0
0	ADDITION	40	PP BK 11		0	0.0	0.0	0.0	0.0	0.0	0.0	2.13	1.02	0.0	0
0	ADDITION	41	PP-CAPEHART		0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
0	ADDITION	45	CAPEHART REG		0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
0	ADDITION	44	CAPEHART TAP		0	0.0	0.0	0.0	0.0	0.0	0.0	2.16	1.04	1.00	0
0	ADDITION	43	CAPEHART LD		0	0.0	0.0	0.0	0.0	0.0	0.0	3.01	1.44	1.40	0
0	ADDITION	61	CAPEHART BOQ		0	0.0	0.0	0.0	0.0	0.0	0.0	0.48	0.23	0.0	0
0	ADDITION	46	MONTFORD PT		0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
0	ADDITION	108	MONT. REG		0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
0	ADDITION	47	MP BREWSTER		0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
0	ADDITION	31	MP UTIL SP		0	0.0	0.0	0.0	0.0	0.0	0.0	0.30	0.14	0.0	0
0	ADDITION	60	MP TO MIDWAY		0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
0	ADDITION	48	MP MIDWAY LD		0	0.0	0.0	0.0	0.0	0.0	0.0	0.89	0.43	0.0	0
0	ADDITION	50	MP OLD SUB		0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
0	ADDITION	51	MP KNOX TAP		0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
0	ADDITION	52	MP KNOX LOAD		0	0.0	0.0	0.0	0.0	0.0	0.0	0.30	0.15	0.0	0
0	ADDITION	53	MP REG 500		0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
0	ADDITION	54	MP BK 31		0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
0	ADDITION	55	MP CAMP 1-3		0	0.0	0.0	0.0	0.0	0.0	0.0	1.12	0.54	0.50	0
0	ADDITION	56	MP BK 42		0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
0	ADDITION	57	MP CAMP 2		0	0.0	0.0	0.0	0.0	0.0	0.0	0.21	0.10	0.0	0

BASE CASE BUS DATA

TYPE	ACTION	BUS	NAME	REG	C-BUS	VOLTS	ANGLE	PGEN	QGEN	QMIN	QMAX	PLOAD	QLOAD	BSR	AREA
0	ADDITION	42	HOSP, FDR		0	0.0	0.0	0.0	0.0	0.0	0.0	4.71	2.26	2.20	0
0	ADDITION	107	HOSP REG		0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
0	END DATA	9999			0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0

	LINES	AUTOMATIC TAP-CHANGERS	PHASE SHIFTERS
MAXIMUM	2500	500	25
ACTUAL	99	10	0

LINE AND TRANSFORMER DATA

X----FROM BUS----X NO.	NAME	X-----TO BUS-----X NO.	NAME	X--IMPEDANCE--X R(PCT)	X(PCT)	MVA LINE CHARGING	X-------LTC TRANSFORMER-------X TAP	TMIN	TMAX	C-B	VOLTS	X--PHS SHFT--X ANGLE(DEG)	X--RATINGS--X NORM	EMERG
2*	MAIN SUB	3	RIFLE RANGE	1.80	4.10	0.0							11	0
2*	MAIN SUB	10	FR CRK REG	33.00	75.40	0.0							11	0
2*	MAIN SUB	13	IND FDR	1.40	3.20	0.0							11	0
2*	MAIN SUB	15	REG 2	1.50	3.40	0.0							11	0
2*	MAIN SUB	20	REG 3	1.50	3.40	0.0							11	0
2*	MAIN SUB	24	REG 1 BK 41	14.20	31.50	0.0							11	0
2*	MAIN SUB	35	PARIDISE PT	13.60	26.60	0.0							11	0
2*	MAIN SUB	45	CAPEHART REG	55.90	127.50	0.0							11	0
2*	MAIN SUB	46	MONTFORD PT	1.90	4.40	0.0							11	0
2*	MAIN SUB	107	HOSP REG	78.50	179.50	0.0							11	0
3	RIFLE RANGE	2*	MAIN SUB	1.80	4.10	0.0							6	0
3*	RIFLE RANGE	67	RR DUNCAN ST	54.50	71.90	0.0							6	0
4*	RR REG 600	5	RR REG 600	0.0	140.00	0.0	0.910	0.910	0.910	5	1.000		6	0
4	RR REG 600	80*	RR MARINE RD	63.00	83.20	0.0							3	0
4*	RR REG 600	89	RR ENGR STK	61.00	34.50	0.0							6	0
5	RR REG 600	4*	RR REG 600	0.0	140.00	0.0							6	0
5*	RR REG 600	71	RR TRIANGLE	45.40	59.90	0.0							5	0
6*	RR REG 500	7	RR BK 43	0.0	140.00	0.0	0.900	0.900	0.900	7	1.000		6	0
6	RR REG 500	84*	RR AMMO	21.30	28.10	0.0							5	0
7	RR BK 43	6*	RR REG 500	0.0	140.00	0.0							6	0
7*	RR BK 43	77	RR C1 HOUSE	37.20	49.20	0.0							6	0
7*	RR BK 43	78	RR AMPHIB TP	28.60	37.70	0.0							1	0
8*	RR BK 40	9	RR REG 120	0.0	583.30	0.0	0.975	0.975	0.975	9	1.000		6	0
8	RR BK 40	78*	RR AMPHIB TP	223.70	295.30	0.0							3	0
8*	RR BK 40	101	RR SPR 245 T	81.40	46.00	0.0							1	0
9	RR REG 120	8*	RR BK 40	0.0	583.30	0.0							3	0
9*	RR REG 120	79	RR LOAD	81.40	46.00	0.0							11	0
10	FR CRK REG	2*	MAIN SUB	33.00	75.40	0.0	1.000	0.900	1.100	11	1.000		15	0
10*	FR CRK REG	11	FR CRK 2/0 T	0.0	46.60	0.0							15	0
11	FR CRK 2/0 T	10*	FR CRK REG	0.0	46.60	0.0							5	0
11*	FR CRK 2/0 T	66	FR CRK 2/0 L	1.20	1.10	0.0							10	0
11*	FR CRK 2/0 T	70	FR CRK 1/0 T	8.10	19.80	0.0							6	0
12	FR CRK 1/0 L	70*	FR CRK 1/0 T	15.20	20.10	0.0							11	0
13	IND FDR	2*	MAIN SUB	1.40	3.20	0.0							6	0
13*	IND FDR	14	IND FDR LOAD	38.30	50.10	0.0							6	0
14	IND FDR LOAD	13*	IND FDR	38.30	50.10	0.0								

T --- INDICATES TIE LINE OWNER AND METERING POINT. * --- INDICATES NON TIE LINE METERING POINT.

LINE AND TRANSFORMER DATA

X----FROM BUS----X NO.	NAME	X-----TO BUS-----X NO.	NAME	X--IMPEDANCE--X R(PCT)	X(PCT)	2500A LINE CHARGING	X--LTC TRANSFORMER--X TAP	TMIN	TMAX	C-B	VOLTS	X--PHS SHFT--X ANGLE(DEG)	X--RATINGS--X NORM	EMERG
15	REG 2	2*	MAIN SUB	1.50	3.40	0.0							11	0
15*	REG 2	16	REG 2 GUM	8.70	21.40	0.0							10	0
16	REG 2 GUM	15*	REG 2	8.70	21.40	0.0							10	0
16*	REG 2 GUM	17	REG 2	7.40	18.20	0.0							10	0
17*	REG 2	16*	REG 2 GUM	7.40	18.20	0.0							10	0
17*	REG 2	18*	REG 2	0.00	0.00	0.0							10	0
18*	REG 2	17*	REG 2	0.00	0.00	0.0							10	0
19*	REG 2	20*	REG 2	0.00	0.00	0.0							10	0
20*	REG 2	19*	REG 2	0.00	0.00	0.0							10	0
21*	REG 2	22*	REG 2	0.00	0.00	0.0							10	0
22*	REG 2	21*	REG 2	0.00	0.00	0.0							10	0
23*	REG 2	24*	REG 2	0.00	0.00	0.0							10	0
24*	REG 2	23*	REG 2	0.00	0.00	0.0							10	0
25	REG 2	26*	REG 2	0.00	0.00	0.0							10	0
26*	REG 2	25	REG 2	0.00	0.00	0.0							10	0
27*	REG 2	28*	REG 2	0.00	0.00	0.0							10	0
28*	REG 2	27*	REG 2	0.00	0.00	0.0							10	0
29*	REG 2	30*	REG 2	0.00	0.00	0.0							10	0
30*	REG 2	29*	REG 2	0.00	0.00	0.0							10	0
31*	REG 2	32*	REG 2	0.00	0.00	0.0							10	0
32*	REG 2	31*	REG 2	0.00	0.00	0.0							10	0
33*	REG 2	34*	REG 2	0.00	0.00	0.0							10	0
34*	REG 2	33*	REG 2	0.00	0.00	0.0							10	0
35	PARADISE PT	2*	MAIN SUB	13.60	26.60	0.0							11	0
T 35**	PARADISE PT	TIE LINE	REG 1000 TERMINAL	9.60	23.60	0.0							10	0

T --- INDICATES TIE LINE OWNER AND METERING POINT. * --- INDICATES NON TIE LINE METERING POINT.

LINE AND TRANSFORMER DATA

X----FROM BUS----X NO.	NAME	X-----TO BUS-----X NO.	NAME	X--IMPEDANCE--X R(PCT)	X(PCT)	MVA LINE CHARGING	X-------LTC TRANSFORMER-------X TAP	TMIN	TMAX	C-B	VOLTS	X--PHS SHFT--X ANGLE(DEG)	X--RATINGS--X NORM	EMERG
36	PP REG 1000	35*	PARIDISE PT	9.60	23.60	0.0							10	0
36*	PP REG 1000	37	PP REG	0.0	70.00	0.0	1.000	0.900	1.100	37	1.000		10	0
37*	PP REG	34	PP HOSP FDR	24.90	32.90	0.0							6	0
37	PP REG	36*	PP REG 1000	0.0	70.00	0.0							10	0
37*	PP REG	38	PP BK 18	30.50	75.10	0.0							10	0
38	PP BK 18	37*	PP REG	30.50	75.10	0.0							10	0
38*	PP BK 18	40	PP BK 11	24.50	60.30	0.0							10	0
40	PP BK 11	38*	PP BK 18	24.50	60.30	0.0							10	0
41	PP-CAPEHART	43*	CAPEHART LD	11.80	27.20	0.0							11	0
42	HOSP. FDR	107*	HOSP REG	0.0	46.60	0.0							15	0
43*	CAPEHART LD	41	PP-CAPEHART	11.80	27.20	0.0							11	0
43	CAPEHART LD	44*	CAPEHART TAP	10.80	24.80	0.0							11	0
43*	CAPEHART LD	61	CAPEHART BOQ	35.90	47.00	0.0							6	0
44*	CAPEHART TAP	43	CAPEHART LD	10.80	24.80	0.0							11	0
44	CAPEHART TAP	45*	CAPEHART REG	0.0	35.00	0.0							20	0
45	CAPEHART REG	2*	MAIN SUB	55.90	127.50	0.0							11	0
45*	CAPEHART REG	44	CAPEHART TAP	0.0	35.00	0.0	1.000	0.900	1.100	44	1.000		20	0
46	MONTFORD PT	2*	MAIN SUB	1.90	4.40	0.0							11	0
46*	MONTFORD PT	108	MONT. REG	56.90	139.90	0.0							10	0
47*	MP BREWSTER	31	MP UTIL SP	0.10	0.10	0.0							6	0
47*	MP BREWSTER	50	MP OLD SUB	22.70	55.90	0.0							10	0
47*	MP BREWSTER	60	MP TO MIDWAY	34.50	45.60	0.0							6	0
47	MP BREWSTER	108*	MONT. REG	0.0	46.60	0.0							15	0
48	MP MIDWAY LD	60*	MP TO MIDWAY	0.20	0.20	0.0							6	0
50	MP OLD SUB	47*	MP BREWSTER	22.70	55.90	0.0							10	0
50*	MP OLD SUB	51	MP KNOX TAP	80.20	105.90	0.0							6	0
51	MP KNOX TAP	50*	MP OLD SUB	80.20	105.90	0.0							6	0
51*	MP KNOX TAP	52	MP KNOX LOAD	73.20	41.40	0.0							3	0
51*	MP KNOX TAP	53	MP REG 500	46.70	61.60	0.0							3	0
52	MP KNOX LOAD	51*	MP KNOX TAP	73.20	41.40	0.0							3	0
53	MP REG 500	51*	MP KNOX TAP	46.70	61.60	0.0							3	0
53*	MP REG 500	54	MP BK 31	0.0	140.00	0.0	1.000	0.900	1.100	54	1.000		5	0
54	MP BK 31	53*	MP REG 500	0.0	140.00	0.0							5	0
54*	MP BK 31	55	MP CAMP 1-3	39.50	22.30	0.0							3	0
54*	MP BK 31	56	MP BK 42	14.70	19.50	0.0							6	0
55	MP CAMP 1-3	54*	MP BK 31	39.50	22.30	0.0							3	0
56	MP BK 42	54*	MP BK 31	14.70	19.50	0.0							6	0
56*	MP BK 42	57	MP CAMP 2	86.60	49.00	0.0							3	0
57	MP CAMP 2	56*	MP BK 42	86.60	49.00	0.0							3	0
60	MP TO MIDWAY	47*	MP BREWSTER	34.50	45.60	0.0							6	0
60*	MP TO MIDWAY	48	MP MIDWAY LD	0.20	0.20	0.0							6	0
61	CAPEHART BOQ	43*	CAPEHART LD	35.90	47.00	0.0							6	0
62	REG2 BK35-36	18*	REG 2 BK37	0.50	1.40	0.0							10	0
62*	REG2 BK35-36	63	REG 2 L-N TP	0.60	0.80	0.0							10	0

† --- INDICATES TIE LINE OWNER AND METERING POINT. * --- INDICATES NON TIE LINE METERING POINT.

LINE AND TRANSFORMER DATA

X----FROM BUS----X		X-----TO BUS-----X		X--IMPEDANCE--X		MVA LINE	X-------LTC TRANSFORMER-------X				X--PHS SHFT--X	X--RATINGS--X	
NO.	NAME	NO.	NAME	R(PCT)	X(PCT)	CHARGING	TAP	TMIN	TMAX	C-B	VOLTS	ANGLE(DEG)	NORM	EMERG
62*	REG2 BK35-36	97	REG 2	5.00	12.40	0.0							10	0
63	REG 2 L-N TP	62*	REG2 BK35-36	0.60	0.80	0.0							10	0
63*	REG 2 L-N TP	64	REG 2 N-ST	12.60	14.00	0.0							7	0
63*	REG 2 L-N TP	65	REG 2 L-ST	62.30	82.30	0.0							6	0
64	REG 2 N-ST	63*	REG 2 L-N TP	12.60	14.00	0.0							7	0
65	REG 2 L-ST	63*	REG 2 L-N TP	62.30	82.30	0.0							6	0
66	FR CRK 2/0 L	11*	FR CRK 2/0 T	1.20	1.10	0.0							5	0
67	RR DUNCAN ST	3*	RIFLE RANGE	54.50	71.90	0.0							6	0
67*	RR DUNCAN ST	68	RR DEADEND	20.40	27.00	0.0							6	0
67*	RR DUNCAN ST	69	RR BK 44	6.60	8.70	0.0							6	0
68	RR DEADEND	67*	RR DUNCAN ST	20.40	27.00	0.0							6	0
69*	RR BK 44	29	RR MAIN SER	44.50	58.70	0.0							6	0
69	RR BK 44	67*	RR DUNCAN ST	6.60	8.70	0.0							6	0
70	FR CRK 1/0 T	11*	FR CRK 2/0 T	8.10	19.80	0.0							10	0
70*	FR CRK 1/0 T	12	FR CRK 1/0 L	15.20	20.10	0.0							6	0
70*	FR CRK 1/0 T	27	FR CRK MAIN	5.60	13.60	0.0							10	0
71	RR TRIANGLE	5*	RR REG 600	45.40	59.90	0.0							6	0
71*	RR TRIANGLE	72	RR BK 39	10.10	13.40	0.0							6	0
71*	RR TRIANGLE	88	RR TRIANGLE	668.50	378.30	0.0							3	0
72	RR BK 39	71*	RR TRIANGLE	10.10	13.40	0.0							6	0
72*	RR BK 39	73	RR BK39 LOAD	113.60	64.20	0.0							3	0
72*	RR BK 39	102	RR ONSLOW TP	25.60	33.80	0.0							6	0
73	RR BK39 LOAD	72*	RR BK 39	113.60	64.20	0.0							3	0
75	PP HOSP LOAD	34*	PP HOSP FDR	12.00	3.90	0.0							5	0
77	RR CT HOUSE	7*	RR BK 43	37.20	49.20	0.0							6	0
78	RR AMPHIB TP	7*	RR BK 43	28.60	37.70	0.0							6	0
78*	RR AMPHIB TP	8	RR BK 40	223.70	295.30	0.0							6	0
78*	RR AMPHIB TP	83	RR AMPHIB TP	37.80	13.90	0.0							2	0
79	RR LOAD	9*	RR REG 120	81.40	46.00	0.0							3	0
80*	RR MARINE RD	4	RR REG 600	63.00	83.20	0.0							6	0
80	RR MARINE RD	106*	RR REG 500	0.0	140.00	0.0							6	0
81	RR SPR 245	101*	RR SPR 245 T	7.50	4.90	0.0							2	0
82	RR END	101*	RR SPR 245 T	13.50	17.80	0.0							3	0
83	RR AMPHIB TP	78*	RR AMPHIB TP	37.80	13.90	0.0							2	0
84*	RR AMMO	6	RR REG 500	21.30	28.10	0.0							6	0
84*	RR AMMO	85	RR AMMO	107.60	60.90	0.0							3	0
84	RR AMMO	86*	RR MILE HAMM	49.90	65.90	0.0							6	0
85	RR AMMO	84*	RR AMMO	107.60	60.90	0.0							3	0
86*	RR MILE HAMM	84	RR AMMO	49.90	65.90	0.0							6	0
86	RR MILE HAMM	102*	RR ONSLOW TP	91.50	120.80	0.0							6	0
86	RR TRIANGLE	71*	RR TRIANGLE	668.50	378.30	0.0							3	0
89	RR ENGR STK	4*	RR REG 600	61.00	34.50	0.0							3	0
90	REG 2 DHL E	17*	REG 2	23.50	31.00	0.0							6	0
91	REG 2 MAIN S	18*	REG 2 BK37	0.10	0.10	0.0							10	0

T --- INDICATES TIE LINE OWNER AND METERING POINT. * --- INDICATES NON TIE LINE METERING POINT.

LINE AND TRANSFORMER DATA

X----FROM BUS----X		X-----TO BUS-----X		X--IMPEDANCE--X		MVA LINE	X-------LTC TRANSFORMER-------X					X--PHS SHFT--X	X--RATINGS--X	
NO.	NAME	NO.	NAME	R(PCT)	X(PCT)	CHARGING	TAP	TMIN	TMAX	C-B	VOLTS	ANGLE(DEG)	NORM	EMERG
91*	REG 2 MAIN S	92	REG 2 SHOP A	37.90	50.10	0.0							6	0
91*	REG 2 MAIN S	93	REG 2 O-ST	26.40	34.90	0.0							6	0
92	REG 2 SHOP A	91*	REG 2 MAIN S	37.90	50.10	0.0							6	0
93	REG 2 O-ST	91*	REG 2 MAIN S	26.40	34.90	0.0							6	0
94	REG 2	17*	REG 2	4.40	10.70	0.0							10	0
94*	REG 2	18	REG 2 BK37	5.00	12.40	0.0							10	0
94*	REG 2	95	REG 2 LOUIS	27.10	15.30	0.0							3	0
95	REG 2 LOUIS	94*	REG 2	27.10	15.30	0.0							3	0
96	REG 2 BALL P	17*	REG 2	8.80	11.60	0.0							3	0
97*	REG 2	19	REG 2	2.20	5.50	0.0							10	0
97	REG 2	62*	REG2 BK35-36	5.00	12.40	0.0							10	0
97*	REG 2	98	REG 2 K-ST	40.70	23.00	0.0							3	0
98	REG 2 K-ST	97*	REG 2	40.70	23.00	0.0							3	0
99	REG 2 H-ST	19*	REG 2	47.40	26.80	0.0							3	0
100	REG 3 MOLLY	21*	REG 3	20.30	11.50	0.0							3	0
101	RR SPR 245 T	8*	RR BK 40	81.40	46.00	0.0							3	0
101*	RR SPR 245 T	81	RR SPR 245	7.50	4.90	0.0							2	0
101*	RR SPR 245 T	82	RR END	13.50	17.80	0.0							3	0
102	RR ONSLOW TP	72*	RR BK 39	25.60	33.80	0.0							6	0
102*	RR ONSLOW TP	86	RR MILE HAMM	91.50	120.80	0.0							6	0
102*	RR ONSLOW TP	103	RR ONSLOW LD	107.60	60.90	0.0							3	0
103	RR ONSLOW LD	102*	RR ONSLOW TP	107.60	60.90	0.0							3	0
104	REG 1 F-ST	28*	REG 1 MAIN S	39.80	22.50	0.0							3	0
105	REG 1 PU3T L	26*	REG1 BK33-34	39.50	22.30	0.0							3	0
106	RR REG 500	29*	RR MAIN SER	54.20	71.50	0.0							6	0
106*	RR REG 500	80	RR MARINE RD	0.0	140.00	0.0	1.000	0.900	1.100	80	1.000		6	0
107	HOSP REG	2*	MAIN SUB	78.50	179.50	0.0							11	0
107*	HOSP REG	42	HOSP. FOR	0.0	46.60	0.0	1.000	0.900	1.100	42	1.000		15	0
108	MONT. REG	46*	MONTFORD PT	56.90	139.90	0.0							10	0
108*	MONT. REG	47	MP BREWSTER	0.0	46.60	0.0	1.000	0.900	1.100	47	1.000		15	0

T --- INDICATES TIE LINE OWNER AND METERING POINT. * --- INDICATES NON TIE LINE METERING POINT.

LINE AND TRANSFORMER DATA

X----FROM BUS----X NO.	NAME	X-----TO BUS-----X NO.	NAME	X--IMPEDANCE--X R(PCT)	X(PCT)	MVA LINE CHARGING	X-------LTC TRANSFORMER-------X TAP	TMIN	TMAX	C-B	VOLTS	X--PHS SHFT--X ANGLE(DEG)	X--RATINGS--X NORM	EMERG
91*	REG 2 MAIN S	92	REG 2 SHOP A	37.90	50.10	0.0							6	0
91*	REG 2 MAIN S	93	REG 2 O-ST	26.40	34.90	0.0							6	0
92	REG 2 SHOP A	91*	REG 2 MAIN S	37.90	50.10	0.0							6	0
93	REG 2 O-ST	91*	REG 2 MAIN S	26.40	34.90	0.0							6	0
94	REG 2	17*	REG 2	4.40	10.70	0.0							10	0
94*	REG 2	18	REG 2 BK37	5.00	12.40	0.0							10	0
94*	REG 2	95	REG 2 LOUIS	27.10	15.30	0.0							3	0
95	REG 2 LOUIS	94*	REG 2	27.10	15.30	0.0							3	0
96	REG 2 BALL P	17*	REG 2	8.80	11.60	0.0							3	0
97*	REG 2	19	REG 2	2.20	5.50	0.0							10	0
97	REG 2	62*	REG2 BK35-36	5.00	12.40	0.0							10	0
97*	REG 2	98	REG 2 K-ST	40.70	23.00	0.0							3	0
98	REG 2 K-ST	97*	REG 2	40.70	23.00	0.0							3	0
99	REG 2 H-ST	19*	REG 2	47.40	26.80	0.0							3	0
100	REG 3 MOLLY	21*	REG 3	20.30	11.50	0.0							3	0
101	RR SPR 245 T	8*	RR BK 40	81.40	46.00	0.0							3	0
101*	RR SPR 245 T	81	RR SPR 245	7.50	4.90	0.0							2	0
101*	RR SPR 245 T	82	RR END	13.50	17.80	0.0							3	0
102	RR ONSLOW TP	72*	RR BK 39	25.60	33.80	0.0							6	0
102*	RR ONSLOW TP	86	RR MILE HAMM	91.50	120.80	0.0							6	0
102*	RR ONSLOW TP	103	RR ONSLOW LD	107.60	60.90	0.0							3	0
103	RR ONSLOW LD	102*	RR ONSLOW TP	107.60	60.90	0.0							3	0
104	REG 1 F-ST	28*	REG 1 MAIN S	39.80	22.50	0.0							3	0
105	REG 1 PUST L	26*	REG1 BK33-34	39.50	22.30	0.0							3	0
106	RR REG 500	29*	RR MAIN SER	54.20	71.50	0.0							6	0
106*	RR REG 500	80	RR MARINE RD	0.0	140.00	0.0	1.000	0.900	1.100	80	1.000		6	0
107	HOSP REG	2*	MAIN SUB	78.50	179.50	0.0							11	0
107*	HOSP REG	42	HOSP. FOR	0.0	46.60	0.0	1.000	0.900	1.100	42	1.000		15	0
108	MONT. REG	46*	MONTFORD PT	56.90	139.90	0.0							10	0
108*	MONT. REG	47	MP BREWSTER	0.0	46.60	0.0	1.000	0.900	1.100	47	1.000		15	0

T --- INDICATES TIE LINE OWNER AND METERING POINT. * --- INDICATES NON TIE LINE METERING POINT.

	BUSSES	REGULATED BUSSES	SWING BUS
MAXIMUM	1500	500	
ACTUAL	100	0	2

BUS DATA

X-----BUS ID-----X NO.	NAME	BUS VOLTS	BUS ANGLE	X---BUS LOAD---X MW	MVAR	X----------BUS GENERATION----------X MW	MVAR	MIN--LIMITS--MAX	C-B VOLTS	LTC VOLTS	STATIC MVAR	AREA
2	MAIN SUB	1.000	0.0	0.0	0.0	0.0	0.0					1
3	RIFLE RANGE	1.000	0.0	0.0	0.0	0.0	0.0					1
4	RR REG 600	1.000	0.0	0.17	0.08	0.0	0.0					1
5	RR REG 600	1.000	0.0	0.0	0.0	0.0	0.0			1.000		1
6	RR REG 500	1.000	0.0	0.0	0.0	0.0	0.0					1
7	RR BK 43	1.000	0.0	0.0	0.0	0.0	0.0			1.000		1
8	RR BK 40	1.000	0.0	0.0	0.0	0.0	0.0					1
9	RR REG 120	1.000	0.0	0.0	0.0	0.0	0.0			1.000		1
10	FR CRK REG	1.000	0.0	0.06	0.03	0.0	0.0				1.60	1
11	FR CRK 2/0 T	1.000	0.0	0.27	0.13	0.0	0.0			1.000		1
12	FR CRK 1/0 L	1.000	0.0	3.52	1.69	0.0	0.0				2.40	1
13	IND FDR	1.000	0.0	0.0	0.0	0.0	0.0					1
14	IND FDR LOAD	1.000	0.0	3.50	1.68	0.0	0.0					1
15	REG 2	1.000	0.0	0.0	0.0	0.0	0.0					1
16	REG 2 GUM	1.000	0.0	0.0	0.0	0.0	0.0					1
17	REG 2	1.000	0.0	0.0	0.0	0.0	0.0					1
18	REG 2 BK37	1.000	0.0	0.0	0.0	0.0	0.0					1
19	REG 2	1.000	0.0	0.0	0.0	0.0	0.0					1
20	REG 3	1.000	0.0	0.0	0.0	0.0	0.0					1
21	REG 3	1.000	0.0	0.36	0.17	0.0	0.0					1
22	REG 3 HOL C	1.000	0.0	0.0	0.0	0.0	0.0					1
23	REG 3 LOAD	1.000	0.0	0.86	0.41	0.0	0.0					1
24	REG 1 BK 41	1.000	0.0	0.0	0.0	0.0	0.0					1
25	REG 1 LUCY	1.000	0.0	0.62	0.30	0.0	0.0					1
26	REG1 BK33-34	1.000	0.0	0.0	0.0	0.0	0.0					1
27	FR CRK MAIN	1.000	0.0	0.0	0.0	0.0	0.0					1
28	REG 1 MAIN S	1.000	0.0	0.0	0.0	0.0	0.0					1
29	RR MAIN SER	1.000	0.0	0.0	0.0	0.0	0.0					1
30	REG 1 C-D ST	1.000	0.0	0.66	0.32	0.0	0.0					1
31	MP UTIL SP	1.000	0.0	0.30	0.14	0.0	0.0					1
32	REG 1 NEW BK	1.000	0.0	2.96	1.42	0.0	0.0					1
33	REG 1 UND GD	1.000	0.0	1.54	0.74	0.0	0.0					1
34	PP HOSP FDR	1.000	0.0	0.0	0.0	0.0	0.0					1
35	PARIDISE PT	1.000	0.0	0.0	0.0	0.0	0.0					1
36	PP REG 1000	1.000	0.0	0.0	0.0	0.0	0.0					1
37	PP REG	1.000	0.0	0.0	0.0	0.0	0.0			1.000		1

BUS DATA

X-----BUS ID-----X NO.	NAME	BUS VOLTS	BUS ANGLE	X---BUS LOAD---X MW	MVAR	X----------BUS GENERATION----------X MW	MVAR	MIN--LIMITS--MAX	C-B VOLTS	LTC VOLTS	STATIC MVAR	AREA
38	PP BK 18	1.000	0.0	2.13	1.02	0.0	0.0					1
40	PP BK 11	1.000	0.0	2.13	1.02	0.0	0.0					1
41	PP-CAPEHART	1.000	0.0	0.0	0.0	0.0	0.0					1
42	HOSP. FDR	1.000	0.0	4.71	2.26	0.0	0.0			1.000	2.20	1
43	CAPEHART LD	1.000	0.0	3.01	1.44	0.0	0.0				1.40	1
44	CAPEHART TAP	1.000	0.0	2.16	1.04	0.0	0.0			1.000	1.00	1
45	CAPEHART REG	1.000	0.0	0.0	0.0	0.0	0.0					1
46	MONTFORD PT	1.000	0.0	0.0	0.0	0.0	0.0					1
47	MP BREWSTER	1.000	0.0	0.0	0.0	0.0	0.0			1.000		1
48	MP MIDWAY LD	1.000	0.0	0.89	0.43	0.0	0.0					1
50	MP OLD SUB	1.000	0.0	0.0	0.0	0.0	0.0					1
51	MP KNOX TAP	1.000	0.0	0.0	0.0	0.0	0.0					1
52	MP KNOX LOAD	1.000	0.0	0.30	0.15	0.0	0.0					1
53	MP REG 500	1.000	0.0	0.0	0.0	0.0	0.0					1
54	MP BK 31	1.000	0.0	0.0	0.0	0.0	0.0			1.000		1
55	MP CAMP 1-3	1.000	0.0	1.12	0.54	0.0	0.0				0.50	1
56	MP BK 42	1.000	0.0	0.0	0.0	0.0	0.0					1
57	MP CAMP 2	1.000	0.0	0.21	0.10	0.0	0.0					1
60	MP TO MIDWAY	1.000	0.0	0.0	0.0	0.0	0.0					1
61	CAPEHART BOQ	1.000	0.0	0.48	0.23	0.0	0.0					1
62	REG2 BK35-36	1.000	0.0	0.0	0.0	0.0	0.0					1
63	REG 2 L-N TP	1.000	0.0	0.0	0.0	0.0	0.0					1
64	REG 2 N-ST	1.000	0.0	0.79	0.38	0.0	0.0					1
65	REG 2 L-ST	1.000	0.0	0.60	0.29	0.0	0.0					1
66	FR CRK 2/0 L	1.000	0.0	1.67	0.80	0.0	0.0					1
67	RR DUNCAN ST	1.000	0.0	0.42	0.20	0.0	0.0				0.22	1
68	RR DEADEND	1.000	0.0	0.22	0.10	0.0	0.0				0.15	1
69	RR BK 44	1.000	0.0	0.0	0.0	0.0	0.0					1
70	FR CRK 1/0 T	1.000	0.0	0.0	0.0	0.0	0.0					1
71	RR TRIANGLE	1.000	0.0	0.0	0.0	0.0	0.0					1
72	RR BK 39	1.000	0.0	0.0	0.0	0.0	0.0					1
73	RR BK39 LOAD	1.000	0.0	0.20	0.10	0.0	0.0				0.60	1
75	PP HOSP LOAD	1.000	0.0	1.07	0.51	0.0	0.0					1
77	RR CT HOUSE	1.000	0.0	2.93	1.41	0.0	0.0				1.40	1
78	RR AMPHIB TP	1.000	0.0	0.0	0.0	0.0	0.0					1
79	RR LOAD	1.000	0.0	0.38	0.0	0.0	0.0					1
80	RR MARINE RD	1.000	0.0	0.0	0.0	0.0	0.0			1.000		1
81	RR SPR 245	1.000	0.0	0.01	0.01	0.0	0.0					1
82	RR END	1.000	0.0	0.0	0.0	0.0	0.0					1
83	RR AMPHIB TP	1.000	0.0	0.04	0.02	0.0	0.0					1
84	RR AMMO	1.000	0.0	0.0	0.0	0.0	0.0					1
85	RR AMMO	1.000	0.0	0.01	0.01	0.0	0.0					1
86	RR MILE HAMM	1.000	0.0	0.0	0.0	0.0	0.0					1
88	RR TRIANGLE	1.000	0.0	0.05	0.02	0.0	0.0					1

BUS DATA

X-----BUS ID-----X NO.	NAME	BUS VOLTS	BUS ANGLE	X---BUS LOAD---X MW	MVAR	X----------BUS GENERATION----------X MW	MVAR	MIN--LIMITS--MAX	C-B	VOLTS	LTC VOLTS	STATIC MVAR	AREA
89	RR ENGR STK	1,000	0,0	0,01	0,00	0,0	0,0						1
90	REG 2 DBL E	1,000	0,0	0,06	0,03	0,0	0,0						1
91	REG 2 MAIN S	1,000	0,0	0,33	0,16	0,0	0,0						1
92	REG 2 SHOP A	1,000	0,0	0,50	0,24	0,0	0,0						1
93	REG 2 O-ST	1,000	0,0	0,58	0,28	0,0	0,0						1
94	REG 2	1,000	0,0	0,0	0,0	0,0	0,0						1
95	REG 2 LOUIS	1,000	0,0	0,43	0,21	0,0	0,0						1
96	REG 2 BALL P	1,000	0,0	0,16	0,07	0,0	0,0						1
97	REG 2	1,000	0,0	0,43	0,21	0,0	0,0						1
98	REG 2 K-ST	1,000	0,0	0,83	0,40	0,0	0,0						1
99	REG 2 H-ST	1,000	0,0	0,87	0,42	0,0	0,0						1
100	REG 3 MULLY	1,000	0,0	1,11	0,53	0,0	0,0						1
101	RR SPR 245 T	1,000	0,0	0,0	0,0	0,0	0,0						1
102	RR ONSLOW TP	1,000	0,0	0,0	0,0	0,0	0,0						1
103	RR ONSLOW LD	1,000	0,0	0,05	0,03	0,0	0,0						1
104	REG 1 F-ST	1,000	0,0	0,45	0,22	0,0	0,0						1
105	REG 1 PUST L	1,000	0,0	0,37	0,18	0,0	0,0						1
106	RR REG 500	1,000	0,0	0,0	0,0	0,0	0,0						1
107	HOSP REG	1,000	0,0	0,0	0,0	0,0	0,0						1
108	MONT, REG	1,000	0,0	0,0	0,0	0,0	0,0						1
	SYSTEM TOTALS			46,58	22,17	0,0	0,0					11,47	

SYSTEM SUMMARY BY AREAS

AREA IDENTIFICATION NO.	NAME	ELEMENTS BUS	LINE	GEN	LTC	PS	GENERATION MW	GENERATION MVAR	UNUSED MVAR	LOAD MW	LOAD MVAR	STATIC MVAR	CHARGING MVAR
1		100	99	0	10	0	0.0	0.0	0.0	46.6	22.2	11.5	0.0
********** SYSTEM TOTALS	ACTUAL	100	99	0	10	0	0.0	0.0	0.0	46.6	22.2	11.5	0.0
	LIMITS	1500	2500	500	500	25							

	ITERATIONS	TOLERANCES BUS ABS MM (PU) P	Q	TOT ABS MM (PU) P	Q	LTC VOLTS	SYSTEM LOSSES MW	MVAR
MAXIMUM	20	0.00050	0.00050	0.01000	0.01000	0.00500	0.0	0.0
ACTUAL	0							

NO LINE CHANGES IN EFFECT SINCE BASE CASE.

CONVERGENCE RECORD

ITER	NODES	P OK	ABS MM P	Q OK	ABS MM Q	ROLL SZ
1	99	56	50,77	56	32,15	742
2	99	54	9,18	56	8,26	742
3	99	74	5,26	75	112,38	742
4	99	71	15,43	72	19,54	742
5	99	83	4,62	87	3,41	742
6	99	90	1,55	95	0,85	742
7	99	95	0,46	99	0,22	742

REGULATED BUSSES WITH LIMIT CHECKS, *---INDICATES MORE BUSSES THAN SHOWN.

SYSTEM SUMMARY BY AREAS

AREA IDENTIFICATION NO.	NAME	ELEMENTS BUS	LINE	GEN	LTC	PS	GENERATION MW	MVAR	UNUSED MVAR	LOAD MW	MVAR	STATIC MVAR	CHARGING MVAR
1		100	99	0	10	0	48.5	15.2	0.0	46.6	22.2	11.7	0.0
********** SYSTEM TOTALS	ACTUAL	100	99	0	10	0	48.5	15.2	0.0	46.6	22.2	11.7	0.0
	LIMITS	1500	2500	500	500	25							

	ITERATIONS	TOLERANCES BUS ABS MM (PU) P	Q	TOT ABS MM (PU) P	Q	LTC VOLTS	SYSTEM LOSSES MW	MVAR
MAXIMUM	20	0.00050	0.00050	0.01000	0.01000	0.00500	2.04	4.91
ACTUAL	7							

5.3 MVA

CONVERGENCE CRITERION -- TOTAL ABSOLUTE MISMATCH

SUMMARY OF MISMATCH -- LINE 1 IS MW, LINE 2 IS MVAR.

BUS	--0	--1	--2	--3	--4	--5	--6	--7	--8	--9
0-			0.0	0.002	-0.036	0.021	-0.053	0.051	-0.002	0.010
			0.0	0.001	0.001	0.010	-0.026	0.033	-0.009	0.004
1-	-0.000	-0.002	0.000	0.000	-0.000	-0.000	-0.000	-0.000	-0.002	-0.000
	-0.000	-0.000	-0.000	0.002	0.000	0.000	-0.000	0.000	-0.000	0.000
2-	0.000	-0.000	-0.000	0.000	-0.000	0.000	-0.000	-0.000	-0.000	0.003
	-0.000	-0.000	-0.000	0.000	0.003	0.000	0.003	-0.000	-0.000	-0.001
3-	0.000	-0.017	0.000	-0.000	-0.000	0.000	0.000	-0.000	0.000	
	0.000	-0.016	0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	
4-	-0.000	0.000	-0.000	0.000	-0.000	0.000	0.000	0.040	0.002	
	-0.000	-0.000	-0.000	0.000	-0.001	0.000	0.001	0.019	0.003	
5-	0.000	0.000	-0.000	0.000	-0.001	0.000	0.000	-0.000		
	0.000	-0.000	0.000	-0.000	-0.000	-0.000	0.000	-0.000		
6-	-0.000	-0.000	-0.001	-0.000	0.000	-0.000	-0.001	0.002	0.000	0.002
	-0.005	-0.000	0.001	-0.001	0.000	0.000	-0.001	-0.001	0.000	-0.001
7-	-0.000	-0.003	-0.001	0.001		-0.000		0.052	0.001	0.005
	-0.000	0.002	0.001	0.000		0.000		-0.010	-0.001	-0.004
8-	0.011	-0.001	-0.000	0.000	-0.009	0.000	-0.011		0.000	0.000
	0.002	0.001	0.000	0.000	0.008	0.000	0.009		0.000	0.000
9-	0.000	0.033	-0.000	-0.000	-0.000	-0.000	0.000	-0.000	-0.000	-0.000
	0.000	0.055	0.000	-0.000	0.002	0.000	0.000	0.001	-0.000	-0.000
10-	-0.000	0.000	-0.007	0.000	-0.000	-0.000	-0.019	0.000	0.000	
	0.000	0.000	0.006	0.000	0.000	-0.000	0.003	0.000	-0.000	

TOTAL ABSOLUTE MISMATCH	0.407	0.254
AVERAGE BUS MISMATCH	0.004	0.003

LOW VOLTAGE SUMMARY -- BUS VOLTAGES BELOW 0.950

NO.	NAME	VOLTS	NO.	NAME	VOLTS	NO.	NAME	VOLTS	NO.	NAME	VOLTS	NO.	NAME	VOLTS
4	RR REG 600	0.948	6	RR REG 500	0.913	29	RR MAIN SER	0.930	84	RR AMMU	0.923	85	RR AMMU	0.923
86	RR MILE HAMM	0.947	89	RR ENGR STK	0.947	106	RR REG 500	0.897						

HIGH VOLTAGE SUMMARY -- BUS VOLTAGES ABOVE 1.050

NO.	NAME	VOLTS	NO.	NAME	VOLTS	NO.	NAME	VOLTS	NO.	NAME	VOLTS	NO.	NAME	VOLTS
54	MP BK 31	1.051	56	MP BK 42	1.050									

SUMMARY OF MONITORED LINES WITHIN RATINGS

X----FROM BUS----X		X-----TO BUS-----X		FLOW	X---RATINGS---X		X----FROM BUS----X		X-----TO BUS-----X		FLOW	X---RATINGS---X	
NO.	NAME	NO.	NAME	MVA	NORM	EMERG	NO.	NAME	NO.	NAME	MVA	NORM	EMERG
2	MAIN SUB	3	RIFLE RANGE	6	11	0	2	MAIN SUB	10	FR CRK REG	6	11	0
2	MAIN SUB	13	IND FDR	4	11	0	2	MAIN SUB	15	REG 2	7	11	0
2	MAIN SUB	20	REG 3	3	11	0	2	MAIN SUB	24	REG 1 BK 41	8	11	0
2	MAIN SUB	35	PARIDISE PT	7	11	0	2	MAIN SUB	45	CAPEHART REG	6	11	0
2	MAIN SUB	46	MONTFORD PT	4	11	0	2	MAIN SUB	107	HOSP REG	5	11	0
4	RR REG 600	5	RR REG 600	4	6	0	4	RR REG 600	89	RR ENGR STK	0	3	0
5	RR REG 600	71	RR TRIANGLE	4	6	0	6	RR REG 500	7	RR BK 43	4	5	0
7	RR BK 43	77	RR CT HOUSE	3	6	0	7	RR BK 43	78	RR AMPHIB TP	1	6	0
8	RR BK 40	101	RR SPR 245 T	0	3	0	9	RR REG 120	79	RR LOAD	1	3	0
10	FR CRK REG	11	FR CRK 2/0 T	6	15	0	11	FR CRK 2/0 T	66	FR CRK 2/0 L	2	5	0
11	FR CRK 2/0 T	70	FR CRK 1/0 T	4	10	0	13	IND FDR	14	IND FDR LOAD	4	6	0
15	REG 2	16	REG 2 GUM	7	10	0	16	REG 2 GUM	17	REG 2	7	10	0
17	REG 2	90	REG 2 DBL E	1	6	0	17	REG 2	94	REG 2	6	10	0
17	REG 2	96	REG 2 BALL P	1	3	0	18	REG 2 BK37	62	REG2 BK35-36	4	10	0
18	REG 2 BK37	91	REG 2 MAIN S	2	10	0	19	REG 2	99	REG 2 H-ST	1	3	0
20	REG 3	21	REG 3	3	10	0	21	REG 3	22	REG 3 HOL C	1	10	0
21	REG 3	100	REG 3 MOLLY	2	3	0	22	REG 3 HOL C	23	REG 3 LOAD	1	3	0
24	REG 1 BK 41	25	REG 1 LUCY	1	6	0	24	REG 1 BK 41	26	REG1 BK33-34	7	11	0
26	REG1 BK33-34	28	REG 1 MAIN S	1	10	0	26	REG1 BK33-34	30	REG 1 C-D ST	1	3	0
26	REG1 BK33-34	32	REG 1 NEW BK	4	6	0	26	REG1 BK33-34	33	REG 1 UND GD	2	6	0
26	REG1 BK33-34	105	REG 1 POST L	1	3	0	28	REG 1 MAIN B	104	REG 1 F-ST	1	3	0
29	RR MAIN SER	106	RR REG 500	5	6	0	34	PP HOSP FDR	75	PP HOSP LOAD	2	5	0
35	PARIDISE PT	36	PP REG 1000	7	10	0	36	PP REG 1000	37	PP REG	7	10	0
37	PP REG	34	PP HOSP FDR	2	6	0	37	PP REG	38	PP BK 18	5	10	0
38	PP BK 18	40	PP BK 11	3	10	0	43	CAPEHART LD	41	PP-CAPEHART	0	11	0
43	CAPEHART LD	61	CAPEHART BUQ	1	6	0	44	CAPEHART TAP	43	CAPEHART LD	4	11	0
45	CAPEHART REG	44	CAPEHART TAP	6	20	0	46	MONTFORD PT	108	MONT. REG	4	10	0
47	MP BREWSTER	31	MP UTIL SP	1	6	0	47	MP BREWSTER	50	MP OLD SUB	2	10	0
47	MP BREWSTER	60	MP TO MIDWAY	1	6	0	50	MP OLD SUB	51	MP KNOX TAP	2	6	0
51	MP KNOX TAP	52	MP KNOX LOAD	1	3	0	51	MP KNOX TAP	53	MP REG 500	2	3	0
53	MP REG 500	54	MP BK 31	2	5	0	54	MP BK 31	55	MP CAMP 1-3	2	3	0
54	MP BK 31	56	MP BK 42	1	6	0	56	MP BK 42	57	MP CAMP 2	1	3	0
60	MP TO MIDWAY	48	MP MIDWAY LD	1	6	0	62	REG2 BK35-36	63	REG 2 L-N TP	2	10	0
62	REG2 BK35-36	97	REG 2	3	10	0	63	REG 2 L-N TP	64	REG 2 N-ST	1	7	0

SUMMARY OF MONITORED LINES WITHIN RATINGS

X----FROM BUS----X		X-----TO BUS-----X		FLOW	X---RATINGS---X		X----FROM BUS----X		X-----TO BUS-----X		FLOW	X---RATINGS---X	
NO.	NAME	NO.	NAME	MVA	NORM	EMERG	NO.	NAME	NO.	NAME	MVA	NORM	EMERG
63	REG 2 L-N TP	65	REG 2 L-ST	1	6	0	67	RR DUNCAN ST	68	RR DEADEND	1	6	0
67	RR DUNCAN ST	69	RR BK 44	5	6	0	69	RR BK 44	29	RR MAIN SER	5	6	0
70	FR CRK 1/0 T	12	FR CRK 1/0 L	4	6	0	70	FR CRK 1/0 T	27	FR CRK MAIN	0	10	0
71	RR TRIANGLE	72	RR BK 39	4	6	0	71	RR TRIANGLE	88	RR TRIANGLE	1	3	0
72	RR BK 39	73	RR BK39 LOAD	1	3	0	72	RR BK 39	102	RR ONSLOW TP	4	6	0
78	RR AMPHIB TP	8	RR BK 40	1	6	0	78	RR AMPHIB TP	83	RR AMPHIB TP	0	2	0
80	RR MARINE RD	4	RR REG 600	5	6	0	84	RR AMMO	6	RR REG 500	4	6	0
84	RR AMMO	85	RR AMMO	0	3	0	86	RR MILE HAMM	84	RR AMMO	4	6	0
91	REG 2 MAIN S	92	REG 2 SHOP A	1	6	0	91	REG 2 MAIN S	93	REG 2 U-ST	1	6	0
94	REG 2	18	REG 2 BK37	6	10	0	94	REG 2	95	REG 2 LOUIS	1	3	0
97	REG 2	19	REG 2	1	10	0	97	REG 2	98	REG 2 K-ST	1	3	0
101	RR SPR 245 T	81	RR SPR 245	0	2	0	101	RR SPR 245 T	82	RR END	0	3	0
102	RR ONSLOW TP	86	RR MILE HAMM	4	6	0	102	RR ONSLOW TP	103	RR ONSLOW LD	1	3	0
106	RR REG 500	80	RR MARINE RD	5	6	0	107	HOSP REG	42	HOSP. FDR	5	15	0
108	MONT. REG	47	MP BREWSTER	3	15	0							

SUMMARY OF MONITORED LINES NOT WITHIN RATINGS

X----FROM BUS----X		X-----TO BUS-----X		FLOW	X---RATINGS---X		X----FROM BUS----X		X-----TO BUS-----X		FLOW	X---RATINGS---X	
NO.	NAME	NO.	NAME	MVA	NORM	EMERG	NO.	NAME	NO.	NAME	MVA	NORM	EMERG
3	RIFLE RANGE	67	RR DUNCAN ST	6	6	0	8	RR BK 40	9	RR REG 120	1	1	0

TRANSFORMER SUMMARY

X----FROM BUS----X NO.	NAME	X-----TO BUS-----X NO.	NAME	TAP RATIO	X---LIMITS---X MIN	MAX	ACTUAL VOLTS	DESIRED VOLTS	CONTROLLED BUS
4	RR REG 600	5	RR REG 600	0.910					
6	RR REG 500	7	RR BK 43	0.900					
8	RR BK 40	9	RR REG 120	0.975					
10	FR CRK REG	11	FR CRK 2/0 T	0.986	0.900	1.100	0.998	1.000	11
36	PP REG 1000	37	PP REG	0.949	0.900	1.100	1.001	1.000	37
45	CAPEHART REG	44	CAPEHART TAP	0.953	0.900	1.100	1.001	1.000	44
53	MP REG 500	54	MP BK 31	0.923	0.900	1.100	1.051	1.000 *	54
106	RR REG 500	80	RR MARINE RD	0.900	0.900	1.100	0.982	1.000 *	80
107	HOSP REG	42	HOSP. FDR	0.948	0.900	1.100	1.001	1.000	42
108	MONT. REG	47	MP BREWSTER	0.960	0.900	1.100	1.003	1.000	47

* --- INDICATES DESIRED VOLTAGE NOT HELD WITHIN RANGE OF 0.00500 PER-UNIT.

REPORT OF POWER FLOW CALCULATIONS FOR AREA 1. 7 ITERATIONS, SWING BUS IS 2.

BUS	NAME	VOLTS	ANGLE	GENERATION MW	GENERATION MVAR	LOAD MW	LOAD MVAR	CAP/REAC MVAR	TO BUS	NAME	MW	MVAR	TAP	SHIFT
2	MAIN SUB	1.000	0.0	48.5	15.2	0.0	0.0		3	RIFLE RANGE	5.36	1.08		
									10	FR CRK REG	5.67	-0.84		
									13	IND FDR	3.57	1.76		
									15	REG 2	5.68	2.90		
									20	REG 3	2.35	1.15		
									24	REG 1 BK 41	6.73	3.40		
									35	PARIDISE PT	5.52	3.25		
									45	CAPEHART REG	5.86	0.89		
									46	MONTFORD PT	2.90	1.07		
									107	MOSP REG	4.91	0.57		
3	RIFLE RANGE	0.999	-0.0	0.0	0.0	0.0	0.0		2	MAIN SUB	-5.35	-1.07		
									67	RR DUNCAN ST	5.35	1.07		
4	RR REG 600	0.948	-0.2	0.0	0.0	0.2	0.1		5	RR REG 600	3.97	0.07	0.910	
									80	RR MARINE RD	-4.19	-0.16		
									89	RR ENGR STK	0.01	0.00		
5	RR REG 600	1.030	-0.3	0.0	0.0	0.0	0.0		4	RR REG 600	-3.97	0.12		
									71	RR TRIANGLE	3.99	-0.11		
6	RR REG 500	0.913	-0.3	0.0	0.0	0.0	0.0		7	RR BK 43	3.28	-0.02	0.900	
									84	RR AMMO	-3.34	-0.01		
7	RR BK 43	1.000	-0.4	0.0	0.0	0.0	0.0		6	RR REG 500	-3.28	0.15		
									77	RR CT HOUSE	2.90	-0.16		
									78	RR AMPHIB TP	0.43	0.05		
8	RR BK 40	0.986	-0.4	0.0	0.0	0.0	0.0		9	RR REG 120	0.37	0.01	0.975	
									78	RR AMPHIB TP	-0.39	-0.02		
									101	RR SPR 245 T	0.01	0.00		
9	RR REG 120	1.004	-0.4	0.0	0.0	0.0	0.0		8	RR BK 40	-0.37	-0.00		
									79	RR LOAD	0.38	0.00		
10	FR CRK REG	0.988	-0.0	0.0	0.0	0.1	0.0	1.6	2	MAIN SUB	-5.56	1.09		
									11	FR CRK 2/0 T	5.50	0.44	0.986R	
11	FR CRK 2/0 T	0.998	-0.1	0.0	0.0	0.3	0.1		10	FR CRK REG	-5.50	-0.30		
									66	FR CRK 2/0 L	1.68	0.81		
									70	FR CRK 1/0 T	3.55	-0.64		
12	FR CRK 1/0 L	0.992	-0.1	0.0	0.0	3.5	1.7	2.4	70	FR CRK 1/0 T	-3.52	0.69		
13	IND FDR	0.999	-0.0	0.0	0.0	0.0	0.0		2	MAIN SUB	-3.57	-1.76		
									14	IND FDR LOAD	3.57	1.76		
14	IND FDR LOAD	0.976	-0.0	0.0	0.0	3.5	1.7		13	IND FDR	-3.51	-1.68		

REPORT OF POWER FLOW CALCULATIONS FOR AREA 1, 7 ITERATIONS, SWING BUS IS 2.

BUS	NAME	VOLTS	ANGLE	GENERATION MW	GENERATION MVAR	LOAD MW	LOAD MVAR	CAP/REAC MVAR	TO BUS	NAME	MW	MVAR	TAP	SHIFT
15	REG 2	0,998	-0,0	0,0	0,0	0,0	0,0		2	MAIN SUB	-5,67	-2,89		
									16	REG 2 GUM	5,67	2,89		
16	REG 2 GUM	0,987	-0,0	0,0	0,0	0,0	0,0		15	REG 2	-5,64	-2,80		
									17	REG 2	5,64	2,80		
17	REG 2	0,978	-0,0	0,0	0,0	0,0	0,0		16	REG 2 GUM	-5,61	-2,73		
									90	REG 2 DBL E	0,06	0,03		
									94	REG 2	5,39	2,62		
									96	REG 2 BALL P	0,16	0,07		
18	REG 2 BK37	0,966	-0,0	0,0	0,0	0,0	0,0		62	REG2 BK35-36	3,54	1,71		
									91	REG 2 MAIN S	1,38	0,63		
									94	REG 2	-4,93	-2,34		
19	REG 2	0,963	-0,0	0,0	0,0	0,0	0,0		97	REG 2	-0,88	-0,42		
									99	REG 2 M-ST	0,88	0,42		
20	REG 3	0,999	-0,0	0,0	0,0	0,0	0,0		2	MAIN SUB	-2,35	-1,15		
									21	REG 3	2,35	1,15		
21	REG 3	0,992	-0,0	0,0	0,0	0,4	0,2		20	REG 3	-2,34	-1,12		
									22	REG 3 HOL C	0,87	0,42		
									100	REG 3 MOLLY	1,11	0,53		
22	REG 3 HOL C	0,991	-0,0	0,0	0,0	0,0	0,0		21	REG 3	-0,87	-0,42		
									23	REG 3 LOAD	0,87	0,42		
23	REG 3 LOAD	0,986	-0,0	0,0	0,0	0,9	0,4		22	REG 3 HOL C	-0,86	-0,41		
24	REG 1 BK 41	0,980	-0,0	0,0	0,0	0,0	0,0		2	MAIN SUB	-6,65	-3,23		
									25	REG 1 LUCY	0,62	0,30		
									26	REG1 BK33-34	6,03	2,93		
25	REG 1 LUCY	0,978	-0,0	0,0	0,0	0,6	0,3		24	REG 1 BK 41	-0,62	-0,30		
26	REG1 BK33-34	0,976	-0,0	0,0	0,0	0,0	0,0		24	REG 1 BK 41	-6,02	-2,90		
									28	REG 1 MAIN S	0,45	0,22		
									30	REG 1 C-D ST	0,66	0,32		
									32	REG 1 NEW BK	2,98	1,44		
									33	REG 1 UND GD	1,55	0,75		
									105	REG 1 POST L	0,37	0,18		
27	FR CRK MAIN	0,996	-0,1	0,0	0,0	0,0	0,0		70	FR CRK 1/0 T	-0,00	-0,00		
28	REG 1 MAIN S	0,975	-0,0	0,0	0,0	0,0	0,0		26	REG1 BK33-34	-0,45	-0,22		
									104	REG 1 F-ST	0,45	0,22		

REPORT OF POWER FLOW CALCULATIONS FOR AREA 1. 7 ITERATIONS, SWING BUS IS 2.

BUS	NAME	VOLTS	ANGLE	GENERATION MW	GENERATION MVAR	LOAD MW	LOAD MVAR	CAP/REAC MVAR	TO BUS	NAME	MW	MVAR	TAP	SHIFT
29	RR MAIN SER	0.930	-0.1	0.0	0.0	0.0	0.0		69	RR BK 44	-4.44	-0.74		
									106	RR REG 500	4.44	0.74		
30	REG 1 C-D ST	0.974	-0.0	0.0	0.0	0.7	0.3		26	REG1 BK33-34	-0.66	-0.32		
31	MP UTIL SP	1.003	-0.1	0.0	0.0	0.3	0.1		47	MP BREWSTER	-0.31	-0.16		
32	REG 1 NEW BK	0.968	-0.0	0.0	0.0	3.0	1.4		26	REG1 BK33-34	-2.96	-1.42		
33	REG 1 UND GD	0.972	-0.0	0.0	0.0	1.5	0.7		26	REG1 BK33-34	-1.54	-0.74		
34	PP HOSP FDR	0.997	-0.1	0.0	0.0	0.0	0.0		37	PP REG	-1.07	-0.51		
									75	PP HOSP LOAD	1.07	0.51		
35	PARIDISE PT	0.984	-0.0	0.0	0.0	0.0	0.0		2	MAIN SUB	-5.46	-3.14		
									36	PP REG 1000	5.46	3.14		
36	PP REG 1000	0.971	-0.0	0.0	0.0	0.0	0.0		35	PARIDISE PT	-5.43	-3.04		
									37	PP REG	5.43	3.04	0.949R	
37	PP REG	1.001	-0.1	0.0	0.0	0.0	0.0		34	PP HOSP FDR	1.07	0.52		
									36	PP REG 1000	-5.43	-2.78		
									38	PP BK 18	4.35	2.26		
38	PP BK 18	0.970	-0.1	0.0	0.0	2.1	1.0		37	PP REG	-4.28	-2.08		
									40	PP BK 11	2.15	1.06		
40	PP BK 11	0.957	-0.1	0.0	0.0	2.1	1.0		38	PP BK 18	-2.13	-1.02		
41	PP-CAPEHART	0.995	-0.1	0.0	0.0	0.0	0.0		43	CAPEHART LD	0.00	-0.00		
42	HOSP. FDR	1.001	-0.1	0.0	0.0	4.7	2.3	2.2	107	HOSP REG	-4.72	-0.03		
43	CAPEHART LD	0.995	-0.1	0.0	0.0	3.0	1.4	1.4	41	PP-CAPEHART	-0.00	0.00		
									44	CAPEHART TAP	-3.49	-0.27		
									61	CAPEHART BUQ	0.48	0.23		
44	CAPEHART TAP	1.001	-0.1	0.0	0.0	2.2	1.0	1.0	45	CAPEHART LD	3.50	0.30		
									45	CAPEHART REG	-5.66	-0.33		
45	CAPEHART REG	0.956	-0.1	0.0	0.0	0.0	0.0		2	MAIN SUB	-5.66	-0.44		
									44	CAPEHART TAP	5.66	0.44	0.953R	
46	MONTFORD PT	0.999	-0.0	0.0	0.0	0.0	0.0		2	MAIN SUB	-2.90	-1.06		
									108	MONT. REG	2.90	1.06		
47	MP BREWSTER	1.003	-0.1	0.0	0.0	0.0	0.0		31	MP UTIL SP	0.31	0.16		
									50	MP OLD SUB	1.68	0.31		

REPORT OF POWER FLOW CALCULATIONS FOR AREA 1, 7 ITERATIONS, SWING BUS IS 2,

BUS	NAME	VOLTS	ANGLE	GENERATION MW	GENERATION MVAR	LOAD MW	LOAD MVAR	CAP/REAC MVAR	TO BUS	NAME	MW	MVAR	TAP	SHIFT
									60	MP TO MIDWAY	0,89	0,43		
									108	MONT. REG	-2,84	-0,89		
48	MP MIDWAY LD	0,998	-0,1	0,0	0,0	0,9	0,4							
									60	MP TO MIDWAY	-0,89	-0,43		
50	MP OLD SUB	0,997	-0,1	0,0	0,0	0,0	0,0							
									47	MP BREWSTER	-1,67	-0,30		
									51	MP KNOX TAP	1,67	0,30		
51	MP KNOX TAP	0,980	-0,1	0,0	0,0	0,0	0,0							
									50	MP OLD SUB	-1,65	-0,27		
									52	MP KNOX LOAD	0,30	0,15		
									53	MP REG 500	1,34	0,12		
52	MP KNOX LOAD	0,977	-0,1	0,0	0,0	0,3	0,1							
									51	MP KNOX TAP	-0,30	-0,15		
53	MP REG 500	0,972	-0,1	0,0	0,0	0,0	0,0							
									51	MP KNOX TAP	-1,33	-0,11		
									54	MP BK 31	1,33	0,11	0,923R	
54	MP BK 31	1,051	-0,1	0,0	0,0	0,0	0,0							
									53	MP REG 500	-1,33	-0,09		
									55	MP CAMP I-3	1,13	-0,01		
									56	MP BK 42	0,21	0,10		
55	MP CAMP I-3	1,046	-0,1	0,0	0,0	1,1	0,5	0,6						
									54	MP BK 31	-1,12	0,01		
56	MP BK 42	1,050	-0,1	0,0	0,0	0,0	0,0							
									54	MP BK 31	-0,21	-0,10		
									57	MP CAMP 2	0,21	0,10		
57	MP CAMP 2	1,048	-0,1	0,0	0,0	0,2	0,1							
									56	MP BK 42	-0,21	-0,10		
60	MP TO MIDWAY	0,998	-0,1	0,0	0,0	0,0	0,0							
									47	MP BREWSTER	-0,89	-0,43		
									48	MP MIDWAY LD	0,89	0,43		
61	CAPEHART BUQ	0,992	-0,1	0,0	0,0	0,5	0,2							
									43	CAPEHART LD	-0,48	-0,23		
62	REG2 BK35-36	0,966	-0,0	0,0	0,0	0,0	0,0							
									18	REG 2 BK37	-3,54	-1,71		
									63	REG 2 L-N TP	1,39	0,67		
									97	REG 2	2,15	1,04		
63	REG 2 L-N TP	0,966	-0,0	0,0	0,0	0,0	0,0							
									62	REG2 BK35-36	-1,39	-0,67		
									64	REG 2 N-ST	0,79	0,38		
									65	REG 2 L-ST	0,60	0,29		
64	REG 2 N-ST	0,964	-0,0	0,0	0,0	0,8	0,4							
									63	REG 2 L-N TP	-0,79	-0,38		
65	REG 2 L-ST	0,959	-0,0	0,0	0,0	0,6	0,3							
									63	REG 2 L-N TP	-0,60	-0,29		
66	FR CRK 2/0 L	0,998	-0,1	0,0	0,0	1,7	0,8							
									11	FR CRK 2/0 T	-1,68	-0,81		
67	RR DUNCAN ST	0,962	-0,0	0,0	0,0	0,4	0,2	0,2						
									3	RIFLE RANGE	-5,19	-0,86		
									68	RR DEADEND	0,22	-0,03		

REPORT OF POWER FLOW CALCULATIONS FOR AREA 1, 7 ITERATIONS, SWING BUS 18 2.

BUS-DATA									LINE-FLOW				
				GENERATION		LOAD		CAP/REAC	TO				
BUS	NAME	VOLTS	ANGLE	MW	MVAR	MW	MVAR	MVAR	BUS	NAME	MW	MVAR	TAP	SHIFT
									69	RR BK 44	4.56	0.90		
68	RR DEADEND	0.961	-0.0	0.0	0.0	0.2	0.1	0.1						
									67	RR DUNCAN ST	-0.22	0.03		
69	RR BK 44	0.958	-0.0	0.0	0.0	0.0	0.0							
									29	RR MAIN SER	4.54	0.88		
									67	RR DUNCAN ST	-4.54	-0.88		
70	FR CRK 1/0 T	0.996	-0.1	0.0	0.0	0.0	0.0							
									11	FR CRK 2/0 T	-3.54	0.86		
									12	FR CRK 1/0 L	3.54	-0.66		
									27	FR CRK MAIN	0.00	0.00		
71	RR TRIANGLE	1.009	-0.3	0.0	0.0	0.0	0.0							
									5	RR REG 600	-3.93	0.20		
									72	RR BK 39	3.88	-0.22		
									88	RR TRIANGLE	0.05	0.02		
72	RR BK 39	1.004	-0.3	0.0	0.0	0.0	0.0							
									71	RR TRIANGLE	-3.86	0.24		
									73	RR BK39 LOAD	0.20	-0.55		
									102	RR ONSLOW TP	3.66	0.32		
73	RR BK39 LOAD	1.003	-0.3	0.0	0.0	0.2	0.1	0.7						
									72	RR BK 39	-0.20	0.56		
75	PP HOSP LOAD	0.995	-0.1	0.0	0.0	1.1	0.5							
									34	PP HOSP FDR	-1.07	-0.51		
77	RR CT HOUSE	0.986	-0.4	0.0	0.0	2.9	1.4	1.6						
									7	RR BK 43	-2.88	0.20		
78	RR AMPHIB TP	0.998	-0.4	0.0	0.0	0.0	0.0							
									7	RR BK 43	-0.43	-0.04		
									8	RR BK 40	0.39	0.02		
									83	RR AMPHIB TP	0.04	0.02		
79	RR LOAD	1.000	-0.4	0.0	0.0	0.4	0.0							
									9	RR REG 120	-0.38	-0.00		
80	RR MARINE RD	0.982	-0.2	0.0	0.0	0.0	0.0							
									4	RR REG 600	4.31	0.31		
									106	RR REG 500	-4.30	-0.31		
81	RR SPR 245	0.986	-0.4	0.0	0.0	0.0	0.0							
									101	RR SPR 245 T	-0.01	-0.01		
82	RR END	0.986	-0.4	0.0	0.0	0.0	0.0							
									101	RR SPR 245 T	-0.00	0.00		
83	RR AMPHIB TP	0.998	-0.4	0.0	0.0	0.0	0.0							
									78	RR AMPHIB TP	-0.04	-0.02		
84	RR AMMO	0.923	-0.3	0.0	0.0	0.0	0.0							
									6	RR REG 500	3.36	0.04		
									85	RR AMMO	0.01	0.01		
									86	RR MILE HAMM	-3.38	-0.04		
85	RR AMMO	0.923	-0.3	0.0	0.0	0.0	0.0							
									84	RR AMMO	-0.01	-0.01		
86	RR MILE HAMM	0.947	-0.3	0.0	0.0	0.0	0.0							
									84	RR AMMO	3.44	0.12		
									102	RR ONSLOW TP	-3.45	-0.11		

REPORT OF POWER FLOW CALCULATIONS FOR AREA 1. 7 ITERATIONS, SWING BUS IS 2.

BUS	NAME	VOLTS	ANGLE	GENERATION MW	GENERATION MVAR	LOAD MW	LOAD MVAR	CAP/REAC MVAR	TO BUS	NAME	MW	MVAR	TAP	SHIFT
88	RR TRIANGLE	1.005	-0.3	0.0	0.0	0.0	0.0		71	RR TRIANGLE	-0.05	-0.02		
89	RR ENGR STR	0.947	-0.2	0.0	0.0	0.0	0.0		4	RR REG 600	-0.01	-0.00		
90	REG 2 DBL E	0.977	-0.0	0.0	0.0	0.1	0.0		17	REG 2	-0.06	-0.03		
91	REG 2 MAIN S	0.966	-0.0	0.0	0.0	0.3	0.2		18	REG 2 BK37	-1.38	-0.63		
									92	REG 2 SHOP A	0.50	0.24		
									93	REG 2 O-ST	0.58	0.28		
92	REG 2 SHOP A	0.963	-0.0	0.0	0.0	0.5	0.2		91	REG 2 MAIN S	-0.50	-0.24		
93	REG 2 O-ST	0.964	-0.0	0.0	0.0	0.6	0.3		91	REG 2 MAIN S	-0.58	-0.28		
94	REG 2	0.972	-0.0	0.0	0.0	0.0	0.0		17	REG 2	-5.38	-2.58		
									18	REG 2 BK37	4.94	2.38		
									95	REG 2 LOUIS	0.43	0.21		
95	REG 2 LOUIS	0.971	-0.0	0.0	0.0	0.4	0.2		94	REG 2	-0.43	-0.21		
96	REG 2 BALL P	0.977	-0.0	0.0	0.0	0.2	0.1		17	REG 2	-0.16	-0.07		
97	REG 2	0.963	-0.0	0.0	0.0	0.4	0.2		19	REG 2	0.88	0.42		
									62	REG2 BK35-36	-2.15	-1.03		
									98	REG 2 K-ST	0.84	0.40		
98	REG 2 K-ST	0.959	-0.0	0.0	0.0	0.8	0.4		97	REG 2	-0.84	-0.40		
99	REG 2 H-ST	0.958	-0.0	0.0	0.0	0.9	0.4		19	REG 2	-0.88	-0.42		
100	REG 3 MOLLY	0.989	-0.0	0.0	0.0	1.1	0.5		21	REG 3	-1.11	-0.53		
101	RR SPR 245 T	0.986	-0.4	0.0	0.0	0.0	0.0		8	RR BK 40	-0.01	-0.00		
									81	RR SPR 245	0.01	0.01		
									82	RR END	0.00	-0.00		
102	RR ONSLOW TP	0.991	-0.3	0.0	0.0	0.0	0.0		72	RR BK 39	-3.63	-0.27		
									86	RR MILE HAMM	3.56	0.25		
									103	RR ONSLOW LD	0.05	0.03		
103	RR ONSLOW LD	0.991	-0.3	0.0	0.0	0.1	0.0		102	RR ONSLOW TP	-0.05	-0.03		
104	REG 1 F-ST	0.973	-0.0	0.0	0.0	0.5	0.2		28	REG 1 MAIN S	-0.45	-0.22		
105	REG 1 POST L	0.974	-0.0	0.0	0.0	0.4	0.2		26	REG1 BK33-34	-0.37	-0.18		
106	RR REG 500	0.897	-0.1	0.0	0.0	0.0	0.0		29	RR MAIN SER	-4.32	-0.57		
									80	RR MARINE RD	4.30	0.58	0.900L	

REPORT OF POWER FLOW CALCULATIONS FOR AREA 1, 7 ITERATIONS, SWING BUS IS 2.

BUS	NAME	VOLTS	ANGLE	GENERATION MW	GENERATION MVAR	LOAD MW	LOAD MVAR	CAP/REAC MVAR	TO BUS	NAME	MW	MVAR	TAP	SHIFT
107	HOSP REG	0.951	-0.1	0.0	0.0	0.0	0.0		2	MAIN SUB	-4.71	-0.14		
									42	HOSP. FDR	4.72	0.14	0.948R	
108	MONT. REG	0.968	-0.0	0.0	0.0	0.0	0.0		46	MONTFORD PT	-2.84	-0.93		
									47	MP BREWSTER	2.84	0.93	0.960R	
		AREA TOTALS		48.5	15.2	46.6	22.2	11.7						

SOLUTION TIME 20.92 SECONDS.
TOTAL TIME 387.56 SECONDS.

50.8 51.6