

ACCELERATED DISTRIBUTION DEMONSTRATION SYSTEM

REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)

ACCESSION NBR: 9211030115 DOC. DATE: 92/10/23 NOTARIZED: NO DOCKET #
 FACIL: 50-269 Oconee Nuclear Station, Unit 1, Duke Power Co. 05000269
 50-270 Oconee Nuclear Station, Unit 2, Duke Power Co. 05000270
 50-287 Oconee Nuclear Station, Unit 3, Duke Power Co. 05000287

AUTH. NAME AUTHOR AFFILIATION
 HAMPTON, J.W. Duke Power Co.
 RECIP. NAME RECIPIENT AFFILIATION
 Document Control Branch (Document Control Desk)

SUBJECT: Provides description & analysis of revised alignment of Keowee auxiliary power sys.

DISTRIBUTION CODE: A001D COPIES RECEIVED: LTR 1 ENCL 1 SIZE: 9
 TITLE: OR Submittal: General Distribution

NOTES:

	RECIPIENT		COPIES			RECIPIENT		COPIES	
	ID CODE/NAME		LTR	ENCL		ID CODE/NAME		LTR	ENCL
	PD2-3 LA		1	1		PD2-3 PD		1	1
	WIENS, L		2	2					
INTERNAL:	ACRS		6	6		NRR/DET/ESGB		1	1
	NRR/DOEA/OTSB11		1	1		NRR/DST/SELB 7E		1	1
	NRR/DST/SICB8H7		1	1		NRR/DST/SRXB 8E		1	1
	NUDOCS-ABSTRACT		1	1		OC/LEMB		1	0
	OGC/HDS2		1	0		REG FILE	01	1	1
	RES/DSIR/EIB		1	1					
EXTERNAL:	NRC PDR		1	1		NSIC		1	1

NOTE TO ALL "RIDS" RECIPIENTS:

PLEASE HELP US TO REDUCE WASTE! CONTACT THE DOCUMENT CONTROL DESK. ROOM P1-37 (EXT. 504-2065) TO ELIMINATE YOUR NAME FROM DISTRIBUTION LISTS FOR DOCUMENTS YOU DON'T NEED!

TOTAL NUMBER OF COPIES REQUIRED: LTR 22 ENCL 20

R
I
D
S
/
A
D
S
/
A
D
S

Duke Power Company
Oconee Nuclear Generation Department
P.O. Box 1439
Seneca, SC 29679

J.W. HAMPTON
Vice President
(803)885-3499 Office
(704)373-5222 FAX



DUKE POWER

October 23, 1992

U. S. Nuclear Regulatory Commission
Document Control Desk
Washington, DC 20555

Subject: Oconee Nuclear Station
Docket Nos. 50-269, -270, -287
Alignment of Keowee Auxiliary Power

On October 22, 1992 at 14:30 a telecon was held with the NRC staff at Region II and ONRR regarding the proposed alignment of the Keowee auxiliary power system. The intent of the alignment is to meet the requirements of the Technical Specifications. As discussed in the telecon, this letter provides:

- 1) A detailed description of the revised alignment of the Keowee auxiliary power system is provided in Attachment 1. Briefly, this aligns one Keowee Unit and dedicates its auxiliaries to the overhead emergency power path and aligns the other Keowee Unit and dedicates its auxiliaries to the underground emergency power path. Oconee Technical Specification (TS) 3.7.2(a)(4) or TS 3.7.2(a)(5) permits operation in this configuration.
- 2) The basis for the acceptability of the current alignment, including consideration of the October 19, 1992 transient is also provided in Attachment 1. This information in conjunction with the following measures provides the basis for exiting the limiting condition for operation (LCO) of Oconee TS 3.7.2(a)2:
 - A) Procedures have been developed, including the associated 50.59 safety evaluation, to direct the Keowee operators to align the Keowee auxiliary power supplies as described above. The Keowee operators were trained on the use of these procedures prior exiting TS 3.7.2(a)2.
 - B) Transformer CT-5 will be maintained energized and available to the Oconee standby buses from either the Central switchyard or the dedicated line from a gas turbine at the Lee steam station. CT-5 will be maintained in this condition until the SBFU relays, which may affect operation of Oconee are modified.
 - C) The Keowee Hydro station will not resume normal operations (i.e., generate to the system grid), except for Technical Specification required testing, until further discussions with the NRC staff are held.
- 3) The tentative schedule for corrective actions to restore the capability to automatically transfer the Keowee auxiliary power supplies is to: 1) modify the Keowee Unit 2 breakers with the "X" closing coil relay by December 31, 1992; and 2) upgrade the Keowee auxiliary power system

9211030115 921023
PDR ADOCK 05000269
P PDR

ADD 1/1

Document Control Desk
October 23, 1992
Page 2

automatic transfer circuits by April 30, 1993.

The 50.59 safety evaluation and the realignment of the Keowee auxiliary power supplies was completed during the evening of October 22, 1992. Upon completion of the realignment, the LCO of Oconee TS 3.7.2(a)2 was exited. Actions regarding the Oconee Unit 2 confirmatory action letter will be addressed separately.

Very Truly Yours,

Joe M Davis for
J. W. Hampton

PJN

xc: L. A. Wiens, Project Manager
NRC/ONRR

P. E. Harmon, Senior Resident Inspector

S. D. Ebnetter, Regional Administrator

ATTACHMENT 1

DESCRIPTION AND ANALYSIS OF THE REVISED ALIGNMENT OF THE KEOWEE AUXILIARY POWER SYSTEM

Description of revised alignment:

The normal Keowee configuration (Figure 1) consists of having both units available for generation to the system grid, using the overhead path (Air Circuit Breaker (ACB)-1 for Keowee Unit 1, and ACB-2 for Keowee Unit 2), with one Keowee Unit aligned to the underground emergency power path by having its underground breaker closed (ACB-3 for Keowee Unit 1 or ACB-4 for Keowee Unit 2). If a Keowee Unit is aligned to the underground emergency power path and is generating to the system grid, the emergency start signal will open the overhead ACB and supply power to the underground emergency power path. The 600V auxiliary load centers (1X and 2X) are normally powered from the overhead path (ACB-5 for Keowee Unit 1, and ACB-6 for Keowee Unit 2) through the respective 1X and 2X transformers, the Keowee Main step-up transformer and the 230kV switchyard. They also have a backup power path (ACB-7 for Keowee Unit 1, and ACB-8 for Keowee Unit 2) from the CX transformer which receives power from Oconee Unit 1 4kV switchgear 1TC. The isolation breakers for the 1X and 2X load control centers (ACBs 5 and 7 for Keowee Unit 1 and ACBs 6 and 8 for Keowee Unit 2) are designed to provide an automatic switch to backup power if normal power to the auxiliaries is lost.

In response to an emergency start signal, both Keowee Units are isolated from the switchyard, and then the Keowee Unit aligned to the underground will provide power to the underground power path. The Keowee Unit aligned to the overhead path will provide power to the overhead path as well as its auxiliaries via transformers 1X or 2X and the auxiliaries of the Keowee Unit aligned to the underground.

The revised alignment removes the automatic switching feature between ACBs 5 and 7 on Keowee Unit 1 and between ACBs 6 and 8 on Keowee Unit 2 by placing the load centers in the manual position. Thus, these breakers would swap only if manually manipulated. The Keowee Unit aligned to the underground would then have auxiliary power supplied from the CX transformer. The Keowee Unit aligned to the underground would have its overhead path ACB open. The other Keowee Unit, aligned to the overhead, would be aligned so that its auxiliaries would be supplied by the overhead path and its ACB from the CX transformer would be open.

Technical Specification 3.7.2(a)(4) and 3.7.2(a)(5) include provisions for alignment in this type of configuration. Figure 2 illustrates the configuration permitted by TS 3.7.2(a)(4). Figure 3 illustrates the configuration permitted by TS 3.7.2(a)(5).

Basis for the acceptability of the revised alignment:

Keowee Hydro Station provides emergency power to Oconee. This power must be available to the Oconee Units through two independent paths, overhead and underground, to withstand a postulated single failure. The revised alignment withstands a postulated single failure and retains the ability to supply emergency

power to Oconee. This is confirmed by a review of the single failure analysis in Chapter 8 of the FSAR (Ref. 1), the Keowee single failure analysis calculation, and the associated Design Basis Document.

For the revised configuration, in a scenario where power is lost from the switchyard (i.e. Loss of Offsite Power), both Keowee Units will DC start and the Keowee Unit aligned to the overhead will provide power to Oconee through the yellow bus after switchyard isolation is complete (4 - 6 seconds). This action will result in the overhead Keowee Unit providing power to its own auxiliaries through its auxiliary transformer. The Keowee Unit aligned to the underground will feed the Oconee standby buses via transformer CT-4. Therefore, the Oconee Units will receive power from either the overhead path or the underground path. Once power is restored to Oconee Unit 1, the CX transformer will then be energized through switchgear 1TC, which will provide power to the Keowee unit aligned to the underground. DC start capability is assured through redundant safety related battery backed DC power supplies and is part of the current licensing basis for Keowee. Either one of the two redundant DC systems is fully capable of emergency starting and running both Keowee Units.

Also, for the revised configuration, for design basis events that do not involve LOOP conditions, both Keowee Units will start with auxiliary power available from the switchyard for the overhead Unit, and from the CX transformer for the underground Unit's auxiliaries.

With regard to single failure considerations with the revised alignment, a loss of the auxiliary transformer for the overhead Unit would result in a loss of auxiliary power for that Unit. However, upon Keowee emergency start signal, that unit would DC start and continue to run. The amount of time that it would run prior to tripping due to low governor oil pressure depends upon the initial governor oil pressure, and the rate at which load is changed. The Keowee operators have local indication of the loss of the load center and various alarms due to the loss of motor control center loads. It is probable that the loss of Keowee auxiliary power would be diagnosed and alternate alignments could be completed prior to the Keowee Unit trip.

Similarly, a failure of the CX transformer would cause a loss of auxiliary power to the underground unit. However, upon Keowee emergency start signal, that unit would DC start and continue to run. The amount of time that it would run prior to tripping due to low governor oil pressure depends upon the initial governor oil pressure, and the rate at which load is changed. The Keowee operators have local indication of the loss of the load center and various alarms due to the loss of motor control center loads. It is probable that the loss of Keowee auxiliary power would be diagnosed and alternate alignments could be completed prior to the Keowee Unit trip.

In either case, a postulated single failure of the auxiliary power to either Keowee Unit would not affect the other Keowee Unit's operation.

The availability and response time of the Keowee Units is unchanged, therefore, accident analyses addressed in the FSAR are unaffected.

Review of the October 19, 1992 transient with regard to the revised alignment:

The following information briefly describes the cause of the loss of power to Keowee auxiliary loads on October 19, 1992 and the basis for concluding that the revised alignment is not susceptible to a similar scenario:

Keowee Unit 1 auxiliary power 10/19/92 alignment. ACB-5 was closed and supplying power from the 1X transformer. Upon lockout of the Keowee main step-up transformer, ACB-5 tripped as designed, and automatic transfer circuitry provided a signal for ACB-7 to close in order to provide power from the CX transformer. In the process of transferring to ACB-7, load center 1X locked out.

Keowee Unit 1 auxiliary power revised alignment, with Keowee Unit 1 aligned to the overhead emergency power path (Figure 3). Assuming the abnormal conditions in the 230kV switchyard, ACB-5 would trip due to lockout of the Keowee main step-up transformer. Keowee Unit 1 would have emergency started (or continued to run if already running) until either the DC system degraded or until governor oil pressure was depleted. For this scenario, the main step-up transformer had locked out which rendered the overhead emergency power path inoperable. Therefore, loss of auxiliary power to Keowee Unit 1 has no further impact on the overhead emergency power path. Auxiliary power could be restored if the Keowee operator manually closed ACB-7. Since the 230kV switchyard DC system is no longer in an alignment which could result in the abnormal conditions experienced on October 19, the lockout of the yellow bus and Keowee main step-up transformer at this time would be considered to be a single failure. Keowee Unit 2 supplying the underground would be unaffected by the lockout.

Keowee Unit 1 auxiliary power revised alignment, with Keowee Unit 1 aligned to the underground emergency power path (Figure 2).

ACB-7 is maintained closed (e.g., in manual) in order to supply power from the CX transformer, thus control components that could prevent ACB-7 closure would not be challenged. Assuming a lockout of the main step-up transformer occurred, ACB-5 is already maintained tripped and would be locked out. ACB-7 is unaffected by a main step-up transformer lockout. ACB-7 would remain closed providing a path from Oconee Unit 1 switchgear 1TC to feed the Keowee Unit 1 auxiliaries from Keowee auxiliary transformer CX, thus allowing Keowee Unit 1 to continue to provide power to Oconee through the underground emergency power path.

Keowee Unit 2 auxiliary power 10/19/92 alignment. ACB-6 was closed and supplying power from the 2X transformer. Upon lockout of the Keowee main step-up transformer, ACB-6 tripped as designed. Automatic transfer circuitry is installed to provide a signal for ACB-8 to close in order to provide power from the CX transformer. ACB-8 did not close as designed. Several control circuit components are suspected (i.e., MG6 control relay contact or breaker "X" closing coil relay).

Keowee Unit 2 auxiliary power revised alignment, with Keowee Unit 2 aligned to the underground emergency power path (Figure 3). ACB-8 is maintained closed (e.g., in manual) in order to supply power from the CX transformer, thus control components that could prevent ACB-8 closure would not be challenged. Assuming a lockout of the main step-up transformer occurred, ACB-6 is already maintained tripped and would be locked out. ACB-8 is unaffected by a main step-up transformer lockout. ACB-8 would remain closed providing a path from Oconee Unit 1 switchgear 1TC to feed the Keowee Unit 2 auxiliaries from Keowee auxiliary transformer CX, thus allowing Keowee Unit 2 to continue to provide power to Oconee through the underground emergency power path.

Keowee Unit 2 auxiliary power revised alignment, with Keowee Unit 2 aligned to the overhead emergency power path (Figure 2).

Assuming the abnormal conditions in the 230kV switchyard, ACB-6 would trip due to lockout of the Keowee main step-up transformer. Keowee Unit 2 would have emergency started (or continued to run if already running) until either the DC system degraded or until governor oil pressure was depleted. For this scenario, the main step-up transformer had locked out which rendered the overhead emergency power path inoperable. Therefore, loss of auxiliary power to Keowee Unit 1 has no further impact on the overhead emergency power path. Auxiliary power could be restored if the Keowee operator manually closed ACB-8. Lockout of the main step-up transformer would result in inoperability of the overhead emergency power path, however the overhead path would already be unavailable due to lockout of the yellow bus. Since the 230kV switchyard DC system is no longer in an alignment which could result in the abnormal conditions experienced on October 19, the lockout of the yellow bus and Keowee main step-up transformer at this time would be considered to be a single failure. Keowee Unit 1 supplying the underground would be unaffected by the lockout.

Conclusions:

Automatic transfer circuitry for the Keowee auxiliary power system as presently installed caused the loss of Keowee auxiliary power. The new alignment places no reliance on this circuitry, thus preventing the loss of auxiliary power. Operation with the auxiliary load center breakers ACB-5, -6, -7, -8 in manual does not involve any safety concerns or unreviewed safety questions.

References:

1. Oconee Nuclear Station FSAR, 1991 Update. Sections 3.1.19, 3.1.21, 3.1.24, 3.1.39, 8.3, 15.6, 15.8, 15.13, 15.14, 15.16, and Table 8.3.

FIGURE 1 : NORMAL ALIGNMENT
 BOTH KEOWEE UNITS GENERATING TO GRID

* SHOWS KEOWEE UNIT 2 ALIGNED
 TO THE UNDERGROUND.

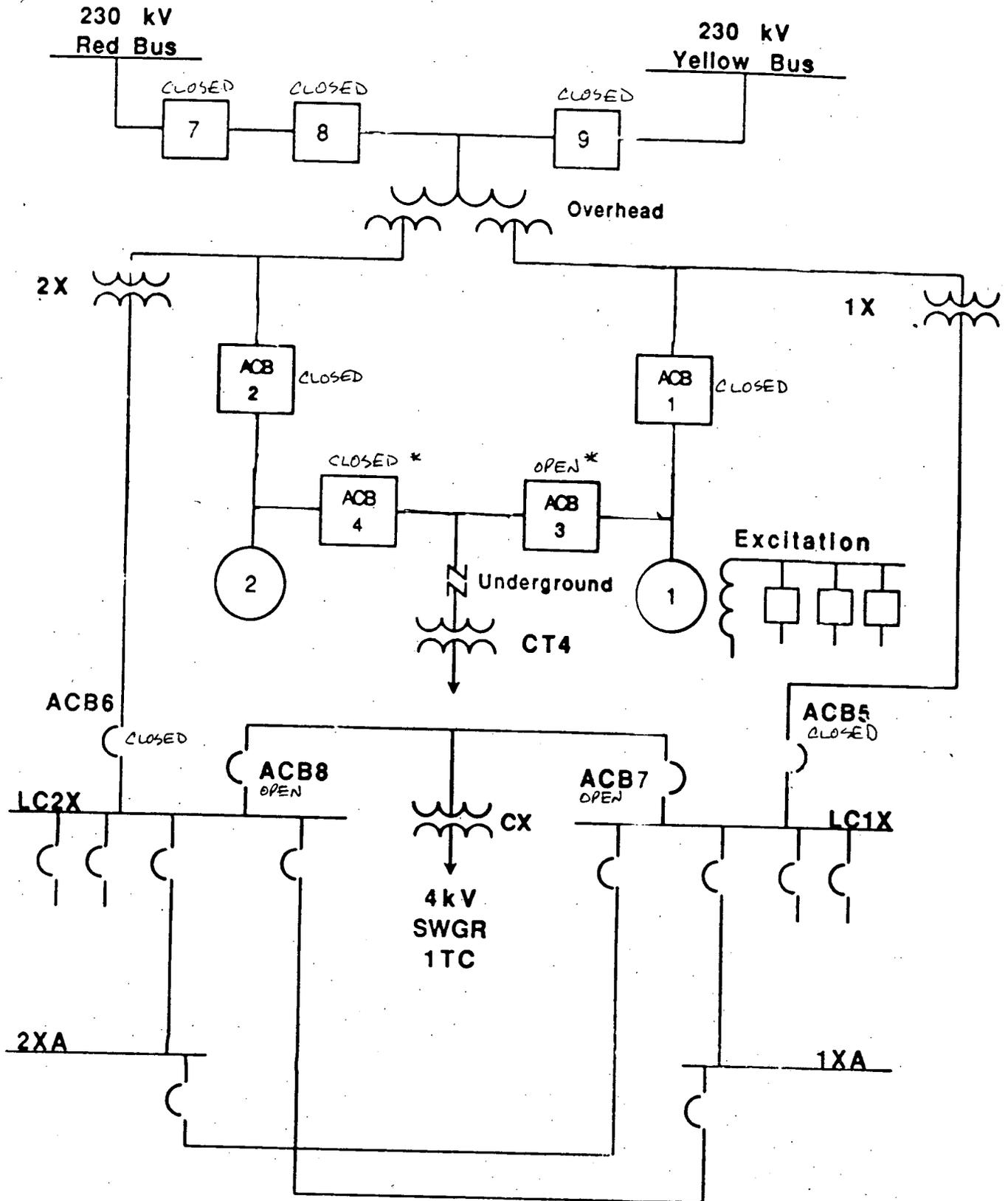


FIGURE 2: KEOWEE UNIT 1 TO UNDERGRAD
 KEOWEE UNIT 2 TO OVERHEAD
 TECH SPEC 3.7.2 (A)(4)

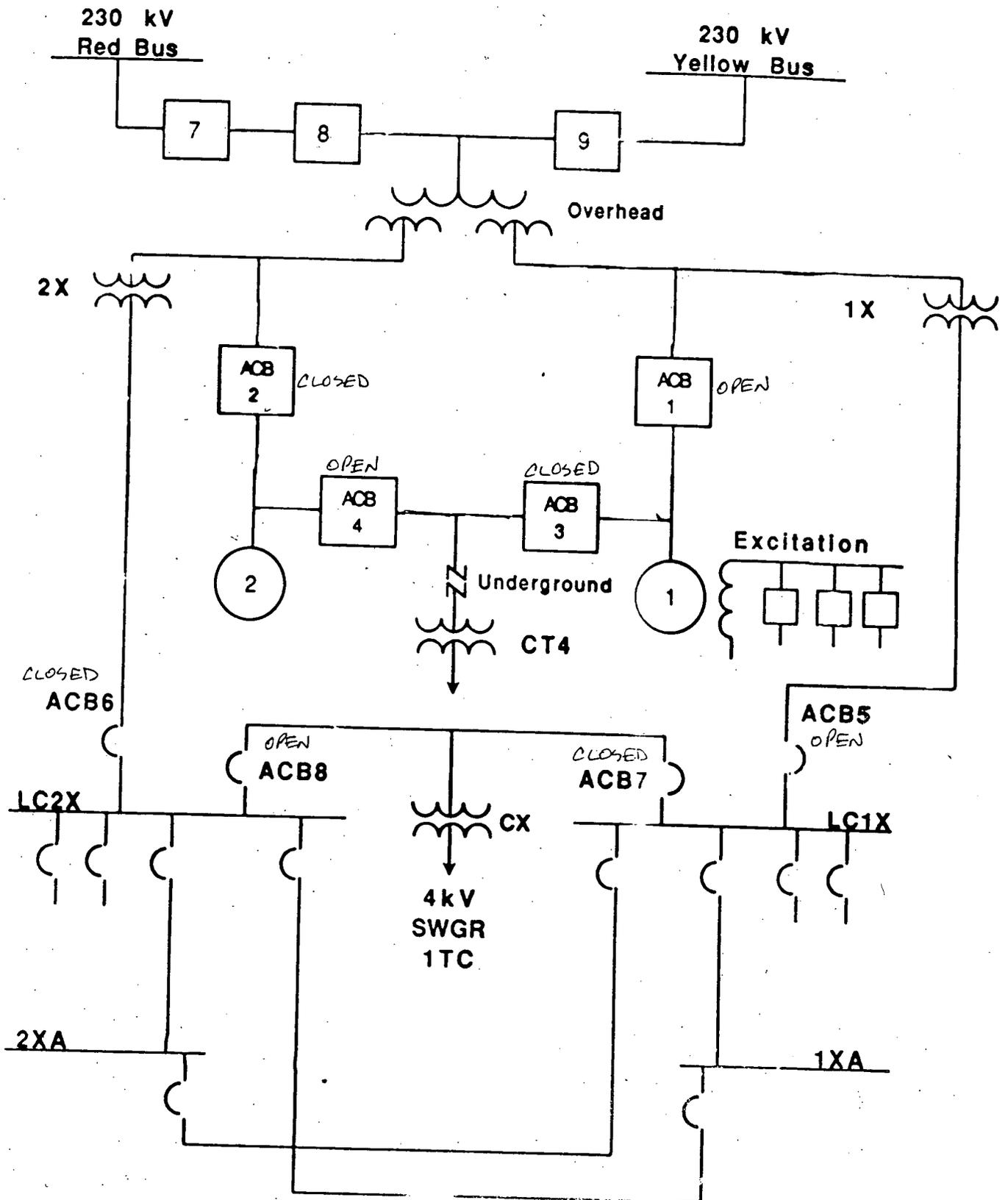


FIGURE 3: KEOWEE UNIT 1 TO OVERHEAD
 KEOWEE UNIT 2 TO UNDERGROUND
 TECH SPEC 3.7.2 (a)(5)

