PACIFIC GAS AND ELECTRIC COMPANY

PG&E

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September 22, 1978

THIS DOCUMENT CONTAINS
POOR QUALITY PAGES

Mr. John F. Stolz, Chief
Light Water Reactors Branch No. 1
Division of Project Management
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

DOCKETED
USNRC
OCT 2 1977
Office of the Secretary
Docketing & Service
Section

Re: Docket No. 50-275-OL
Docket No. 50-323-OL
Diablo Canyon Units 1 & 2

Dear Mr. Stolz:

Enclosed in support of our operating license application are responses to informal questions 1 through 10 transmitted to PGandE in an August 4, 1978 memorandum on the subject of seismic qualifications.

Because portions of the responses are Westinghouse proprietary information, enclosed are 30 copies of the proprietary responses and 30 copies of the non-proprietary version of the same responses. Also enclosed are an application for Withholding Proprietary Information From Public Disclosure and supporting letters from Westinghouse.

Five copies of these reports have been sent directly to Mr. Dennis Allison.

Kindly acknowledge receipt of the above material on the enclosed copy of this letter and return it to me in the enclosed addressed envelope.

Very truly yours,

Philip A. Crane, Jr.

Enclosures
CC w/encs.: Mr. Dennis Allison
Service List w/non-proprietary enclosure

7810130058

NON-PROPRIETARY

This package contains non-proprietary responses to informal questions 1 through 10 transmitted to PGandE in an August 4, 1978 memorandum on the subject of Seismic Qualifications.

Question 1 Seismic Qualification: Auxiliary Safeguards Cabinet

The Auxiliary Safeguards Cabinet contains relays that receive signals from the Solid State Protection System and upon actuation, close or open contacts that operate safeguards devices, mostly valves.

Information in regard to the electrical operability during seismic tests of the Auxiliary Safeguards Cabinet and associated relays has not been described in Section 10.3.2 of the FSAR amendment 50 or in Section 3.10 of the FSAR. The Auxiliary Safeguards Cabinet may be structurally identical to the safeguard test cabinet; however, they are not electrically identical. Provide information in regard to the electrical functions monitored during seismic shaking in order to demonstrate the seismic adequacy of the Auxiliary Safeguards Cabinet.

RESPONSE

1. Auxiliary Safeguards Cabinet

The Auxiliary Safeguards Cabinet contains rotary relays that are used to provide the same electrical function, i.e., safeguard actuation, as the relays contained in the output bay of the three-bay Solid State Protection System. WCAP-8694 describes the seismic qualification of the rotary relays, and concludes that no contact bounce occurred and that the relays operated properly before, during and after the simulated seismic event. WCAP-8941 describes the seismic qualification of these rotary relays in the Auxiliary Safeguards Cabinet, stating that the seismic levels tested in WCAP-8694 are 2 to 3 times greater than those required for this cabinet at the Diablo Canyon site.

QUESTION 2 Seismic Qualification: Instrument AC Inverter (Static Inverter)

The static inverters' function is to supply uninterrupted 118-volt, 60 Hz power to the vital AC instrument bus. The inverter operates from two power sources: a DC voltage source or a 480 volt AC source. In normal operation, the 480 volt AC source supplies power to the inverter. In the event of an AC power failure, the DC voltage source supplies power to the inverter.

It appears from the information in the FSAR that the power source's to the inverter were not changed from the AC source to the DC source during seismic shaking. Provide justification that the tests performed demonstrate the seismic adequacy of the static inverter.

RESPONSE

The inverter is designed such that during normal operation, the inverter power is derived from the AC source with the DC source assuming the load upon loss of AC voltage. The only difference in the system between the two(2) inputs is a diode, used primarily as a blocking diode. The battery supply (normal DC source) is not in the Westinghouse scope of supply and was not tested as part of the system. The diode (solid state) used is a JEDEC device and is used in many military and industrial applications. The military qualification requires that the device be subjected to G-levels much greater than required in this application and therefore the complete function of this one(1) diode was not tested. However, the blocking capability was observed during the seismic test and its integrity was maintained throughout the testing and was therefore acceptable.

During the seismic test, a small DC power supply was used in place of the normal DC power source to verify the blocking capability of the blocking diode. Had the diode shorted during the test, a protective device would have isolated the small DC power suuply, thus indicating diode failure. No such indications were observed. Examination of the diode following the test indicated that no loss of integrity (open circuit) resulted. Therefore, functional operability of the diode during and after the test was demonstrated.

QUESTION 4 Seismic Qualification: Nuclear Instrumentation System

The Nuclear Instrumentation System monitors the neutron flux level and provides reactor trip signals if certain power limits are exceeded.

a) Only the power range channel was energized and monitored during seismic testing. Therefore, it appears that the source range and intermediate range channels, required for reactor start-up and shutdown protection, have not been seismically qualified. Provide justification.

Section 7.5 of the FSAR indicates that the occurrences of a seismic event does not render the source and intermediate range channels inoperative. However, Section 3.10.2 of the FSAR (page 3.10-4) indicates that the source and intermediate range channels are not required to be seismically qualified since any design basis accident described in the FSAR can be terminated within acceptable limits by the power range channels. Provide justification for this apparent inconsistency.

b) Section 3.10.2 of the FSAR (page 3.10-4) indicates that neutron detectors for the nuclear instrumentation system power range channel are seismically qualified. However, the seismic information for neutron detectors does not appear to be in WCAP-7821, WCAP-8021, or the seismic evaluation for postulated 7.5M Hosgri earthquake. (Amendment 50 to the FSAR). Provide the seismic qualification test information for neutron detectors associated with the power range channel as well as those detectors associated with the source and intermediate range channels.

c) Westinghouse committed to retesting an entire typical channel of the nuclear instrumentation system (including signal conditioning circuits and bistables) to verify that the bistables have the capability to change state during a seismic event. Section 10.3.16.2 of the FSAR amendment 50 implies that only bistables have undergone additional testing versus an entire typical channel. Justify the retesting of only the bistables.

d) Two tests were performed to demonstrate the functional operability of bistables as documented in WCAP-8831, Seismic operability demonstration testing of the Nuclear Instrumentation System Bistable Amplifiers. Test 1 (referenced as test 2 in WCAP-8831 Section 5-15) indicates all bistables tripped as required except for the negative rate bistable. The negative bistable was not tested during the seismic shaking. Test 2 (referenced as test 5 in WCAP-8831 section 5-18) indicates 5 of 6 bistables operated as required during the test; however, it appears that the bistables were not tripped and therefore not tested during the seismic shaking as required. The overpower-high range bistable experienced an unexplained trip. And the negative rate bistables was (again as in test 1) not tested. Provide justification that these two tests demonstrate the seismic adequacy of the Nuclear Instrumentation System.

RESPONSE

(a) as stated in FSAR 3.10.2, all design basis accidents discussed in the FSAR can be terminated within acceptable limits by the power range channels. The source and intermediate channels therefore do not require seismic qualification and have not been qualified.

Shutdown procedures will contain the following provisions in the event that the source range channels are rendered inoperative due to a seismic event:

(1) the operator will take appropriate action to preclude boron dilution

(2) prior to cooldown, boric acid will be added to the reactor coolant to ensure that the concentration is sufficient to maintain the reactor in a subcritical state.

(b) The power range neutron detectors at Diablo Canyon are of the integral mineral insulated cable design, Model Number] b,c

Shock and vibration tests have been performed, in the past, on this type of design by the Westinghouse Electronic Tube Division.

The integral cable design was subjected to a vibration test with constant sinosoidal acceleration of 1g in the horizontal and vertical planes. A constant sweep of 2.5 minutes duration was performed from 6 to 20 Hz in the horizontal plane. Following this, another constant sweep of 2.5 minutes duration was performed from 10 to 40 Hz in the vertical direction. In addition, the design was subjected to a sinosoidal acceleration of 1g amplitude for 20 seconds, in the horizontal plane, at frequencies of 6.5 and 7.4 Hz. The performance of the detector was evaluated by checking the resistance, capacitance, and neutron sensitivity before and after the test.

Also, a shock test was performed for this design. The shock input provided a 0.15 second duration pulse which produced an acceleration with a 0.8g radial component and a 0.14g longitudinal component. The performance of the detector was evaluated as before and no detectable damage was observed.

The upper support for the neutron detectors at Diablo Canyon is approximately at elevation 96 feet of the containment interior structure. The zero period acceleration at elevation 102ft. is approximately 0.7g's. This value is less than the test accelerations achieved during the shock and vibration tests discussed previously.

Additional multifrequency and multiaxis test have been performed on a single NIS power range detector (Model   ) mounted in a support assembly which simulated a lower bound or worst case detector holder. The multifrequency inputs were developed in accordance with the guidelines set forth in WCAP-8624 IEEE-344-1975. The attached figure presents a comparison between the multifrequency and multiaxis test spectrum and the required Hosgri spectrum at elevation 102.0 feet of the containment interior. As can be seen in the figure, the test spectrum envelopes the required spectrum.]b,c

During the test, the detector was energized from a hign voltage power supply, and an a-c signal was imposed on the high voltage electrode. This a-c signal as well as d-c leakage currents were monitored on each of the two signal electrodes to determine proper electrical operability.

At the completion of the seismic test, there was no observable mechanical damage and the electrical recordings revealed only a transient type electrical distrubance on one of the two signal electrodes. This electrical disturbance was most likely generated by electrode displacement produced by the detector assembly impacting with the holder assembly. The signal perturbations were small in amplitude (less than 10^{-8} amperes) and would not cause any loss of protection capability of the NI System during normal operation in the presence of a normal detector signal (greater than 10^{-4}

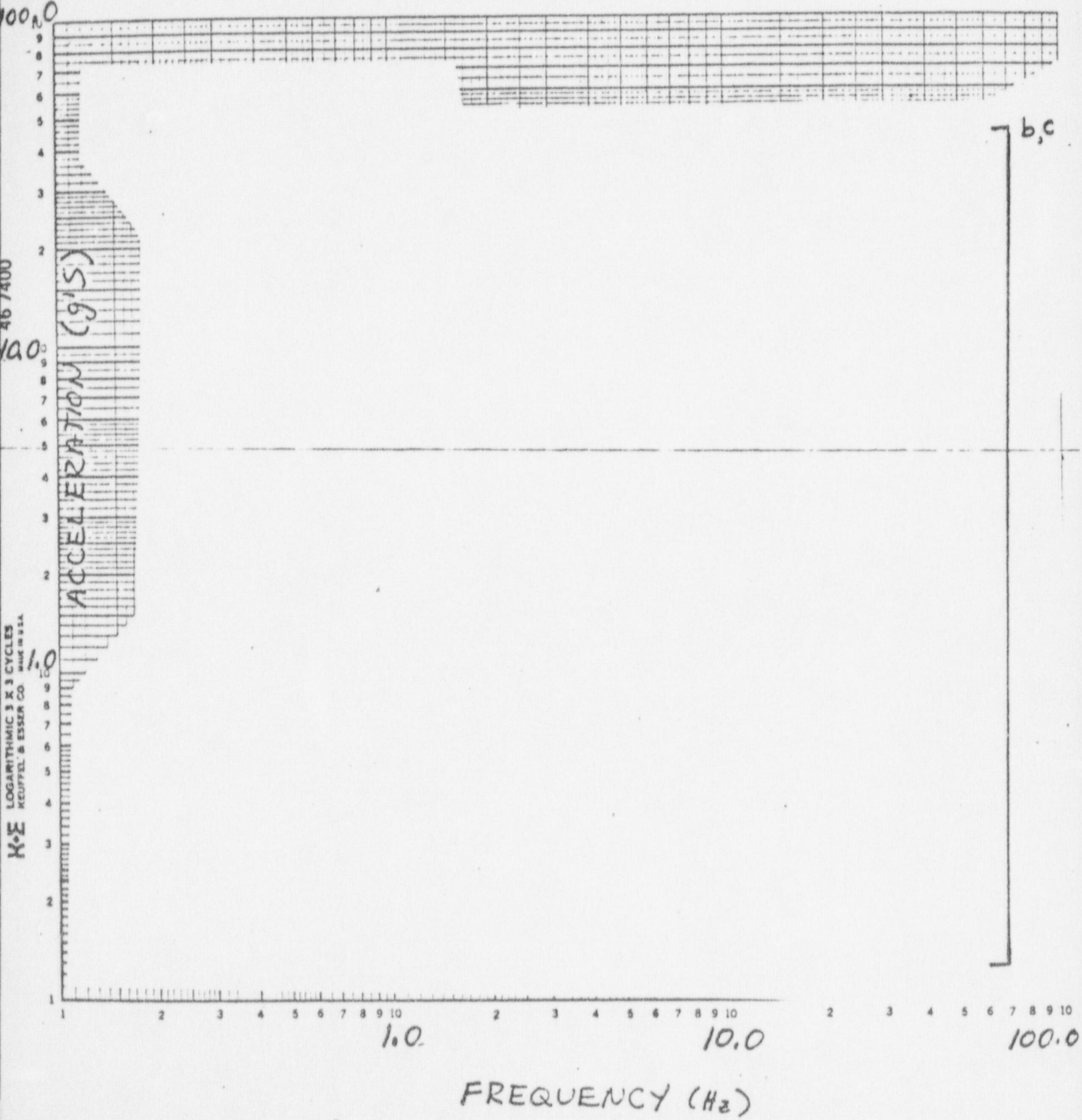
amperes) in an operating plant. Subsequent detector acceptance tests performed by the detector manufacturer did not disclose any abnormal permanent change in the electrical or neutron sensitivity characteristics. Thus it is concluded that the NIS Power Range Detector will operate as required during and after a seismic event.

It is therefore concluded that this equipment is qualified for the Hosgri 7.5M event.

(c) & (d) The purpose of the demonstration test program was to show electrical operability. The electrical operability was verified during Tests 2 and 5 as described in WCAP-8830 for the high seismic OBE and SSE conditions respectively. As a result of the test configuration (single rack in lieu of four) and the frame and rack damage incurred by the seismic test fixture malfunction; mechanical failures prevented the complete test run. As indicated in Section 7 of WCAP-8830, the drawer securing method is being revised for high seismic plants and the details were indicated in Westinghouse letter NS-CE-1609 dated 11/22/77.

Test 2 performed a functional operability test of the bistables by introducing manually adjustable signal into the complete instrumentation channel as indicated in Figure 2-3 of WCAP-8830. The signal profile is shown in Figure 5-8. The negative rate bistables was not exercised during this test; however, the signal conditioning equipment (same as that for positive rate bistable input) and six other bistables units with the same electrical and mechanical design performed as required.

Test 5 was performed under extremely adverse conditions with the failed drawer latches. Recordings (Figures 5-12 through 5-16) indicate that five of the six bistable units performed their required function during the simulated seismic event. The only bistable function not tested was the negative rate trip function. Post seismic test electrical evaluation indicated that all electrical functions performed as required. Further testing was not possible because of the structural damage.



100.0
10.0
1.0
ACCELERATION (g's)
b,c
1.0
10.0
100.0
FREQUENCY (Hz)
K+E LOGARITHMIC 3 X 3 CYCLES
KEUFFEL & ESSER CO.
46 7400

QUESTION 5 Seismic Qualification: Pressure and Differential Pressure Transmitters

Pressure and Differential Pressure Transmitters sense the pressurizer level and pressure, and the steam generator feedwater/system level, pressure, and flow. The output from these transmitters are sent to the process control system equipment which generates the various reactor trips and safeguards actuation signals.

a) PG&E's response dated October 3, 1977 to an NRC Question Number 3.104 states that certain instruments are to be replaced, Steam Generator Narrow Range Level and Pressurizer Level. Confirm that these instruments are in fact the Pressures and Differential Pressure Transmitters being replaced. Provide the seismic qualification information for the replacement instruments, Steam Generator Narrow Range Level, Pressure Level, Reactor Coolant System Pressure, and Containment Sump Level.

b) The electric test results for the transmitters, described in Section 10.3.17.2 of the FSAR Amendment, 50, demonstrated that the output oscillated around the normal signal level. These oscillations could cause trips depending on the monitored variables and the trip point. The tests do not demonstrate that the equipment is capable of meeting its performance specifications under service conditions (during seismic shaking). Provide justification that the tests performed demonstrate the seismic adequacy of the transmitters.

c) The Fischer and Porter transmitter, No. 13D2495 measures Steam Generator Level, was not tested, but was qualified by comparison to the Steam Generator Flow transmitter No. 10B2496, that was tested. Justify the assumption, made on page 4-7 of WCAP-8021, Seismic Testing and Electrical and Control Equipment (PG&E plants), that the output of 13D2495 would offset in a similar fashion under seismic excitation as 10B2496.

d) The transmitter were only tested at some normal valve as indicated in Section 10.3.17.2 of the FSAR Amendment 50. Define normal value and justify not testing over the full range of pressures, levels, or flows that these transmitters would be expected to operate.

RESPONSE

(a) The following transmitters are being replaced at Diablo Canyon:

	Replacement
Steam Generator Narrow Range Level	
Pressurizer Level	
Reactor Coolant System Pressure	
Containment Sump Level	

b,c

The seismic tests of the pressure and differential pressure b,c transmitters was performed using multifrequency triaxial inputs which conform to the requirements of standard IEEE-344-1975.

The multifrequency inputs were developed in accordance with the guidelines for frequency content and phasing set forth in WCAP-8624; "General method of developing multifrequency biaxial test inputs for bistables."

The transmitters were mounted to a test fixture in a manner which simulated actual field mounting. A schematic of the triaxial test setup is shown in attached Figure 1.

b,c

b,c

QUESTION 3 Seismic Qualification: Main Control Board

Provide information in regard to the seismic qualification of individual Class 1E instruments and/or controls mounted on the Main Control board.

RESPONSE

The qualifications of individual instruments and controls mounted on the Main Control board are contained in Paragraph 10.3.15.2 of the Hosgri Report.

]b,c

A summary of the seismic electrical errors are presented in Table 1.

RESPONSE

5(b) Signal level oscillations associated with seismic events were considered in the selection of system setpoints in order that the oscillations would not cause an invalid trip. An amendment in Section 10.3.17.2 of the Hosgri Report is being prepared to clarify that issue.

RESPONSE

5(c) The Fisher and Porter transmitters No. 13D2495 (Narrow Range Steam Generator Level) are being replaced. The Fisher and Porter transmitters No. 13D2495 (Wide Range Steam Generator Level) are not safety related and do not require qualification.

RESPONSE

5(d) The meaning of normal value, as used in Section 10.3.17.2, refers to a transmitter output between the zero and full scale operating range.

A transmitter tested for a seismic event at any given level would be representative of all other levels on the scale as long as the value selected was not so close to either end of the scale that the transmitter would be constrained, preventing the mechanical system from floating freely during the seismic event. It should be noted that the effects of the seismic forces on the transmitter do not vary according to where the scale is reading during a seismic event.

Any pressure transmitter converts pressure to forces. It then measures these forces to determine the pressure. The methods of measurement vary with design but force is always the quantity measured.

A seismic acceleration also imparts a force. This force is a function of the mass of the device and its acceleration. It will be added (or subtracted) from the other forces on the device and will thus provide a pressure deviation in the readout. This force is not a function of the other forces on the device and is therefore not a function of the scale reading before is was applied. Therefore, the deviation that it provides is not a function of the scale reading.

RESPONSE

5(d) Continued

At low pressures, the pressure forces can be small compared to the seismic forces and the relative deviation due to seismic forces will be larger than at high pressures. If, for example, the seismic forces caused a deviation equivalent to 5% of the total range of the device, the relative deviation when the reading was 5% of range would be 100% of reading. If the reading was 90% of range, the relative deviation would be only 6% of reading. For this reason, all seismic errors are considered as a percentage of span, not reading.

Thus, determination of the seismic error is independent of the instrument reading.

WORK SHEET
WESTINGHOUSE FORM 8295 E

TABLE 1

POSITION ON SEISMIC TEST STAND				
SSE				OBE
#1	#2	#3	#4	

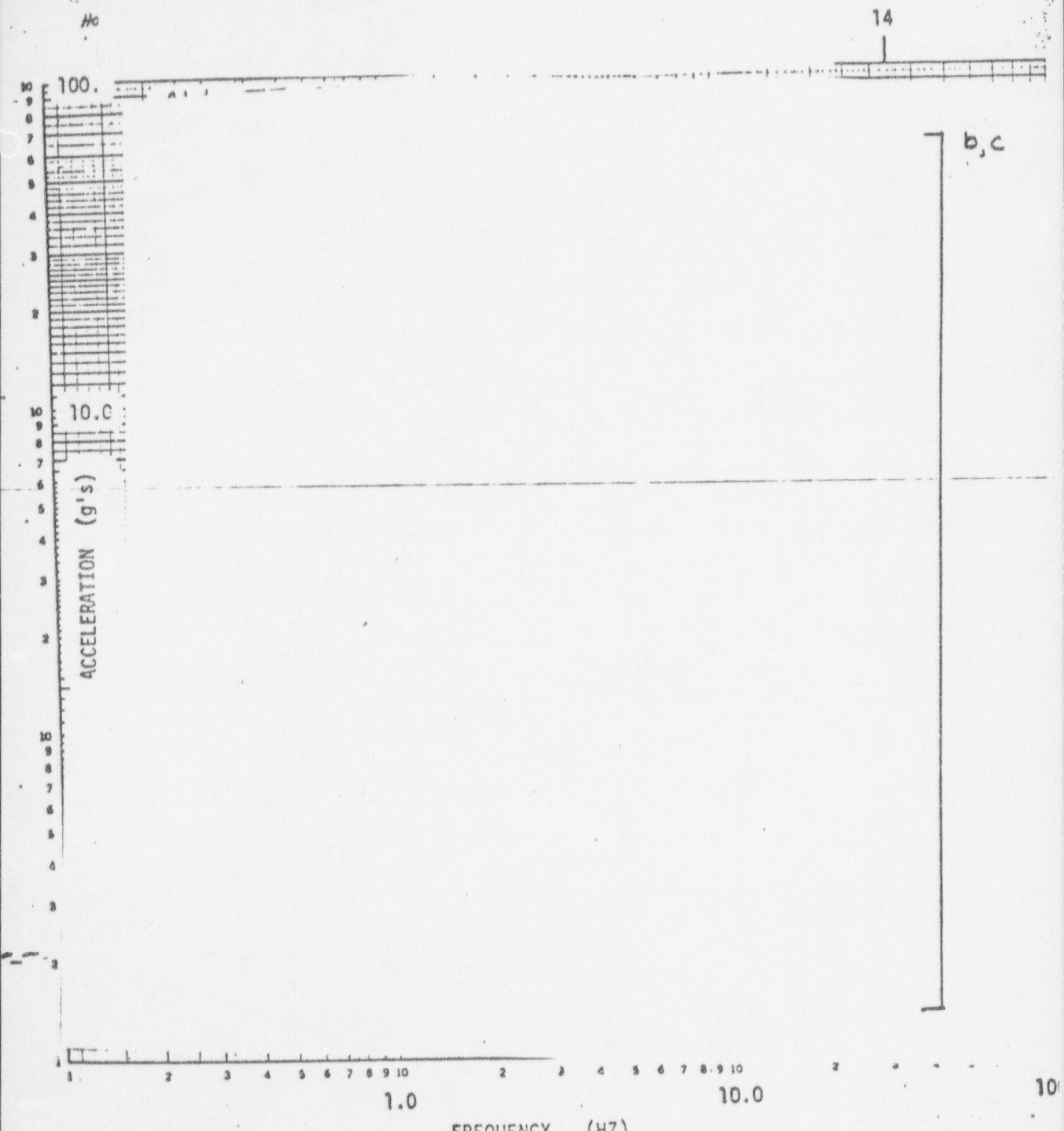
b,c

PRELIMINARY

NOTE: VALUES GIVEN ARE WORST ERRORS FOUND IN 3 RUNS AT EACH POSITION. PERCENT ERRORS ARE PERCENT OF SPAN.

b,c

Figure 1 Schematic of Biaxial Test Setup



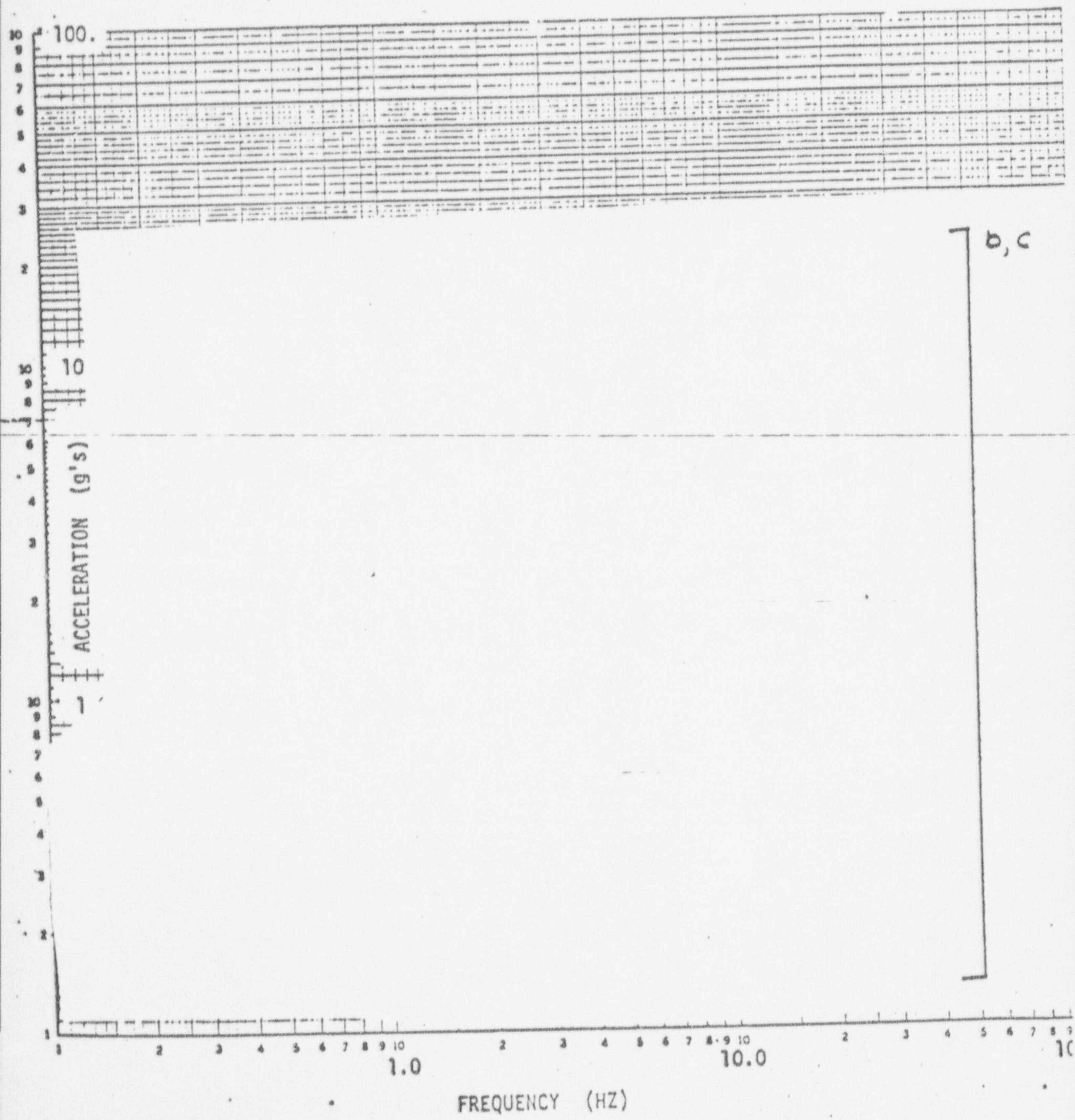
Control Accelerometer

Position_____ Run_____

FIGURE 2

ACCEPTABLE OBE #1

INPUT B (OBE)

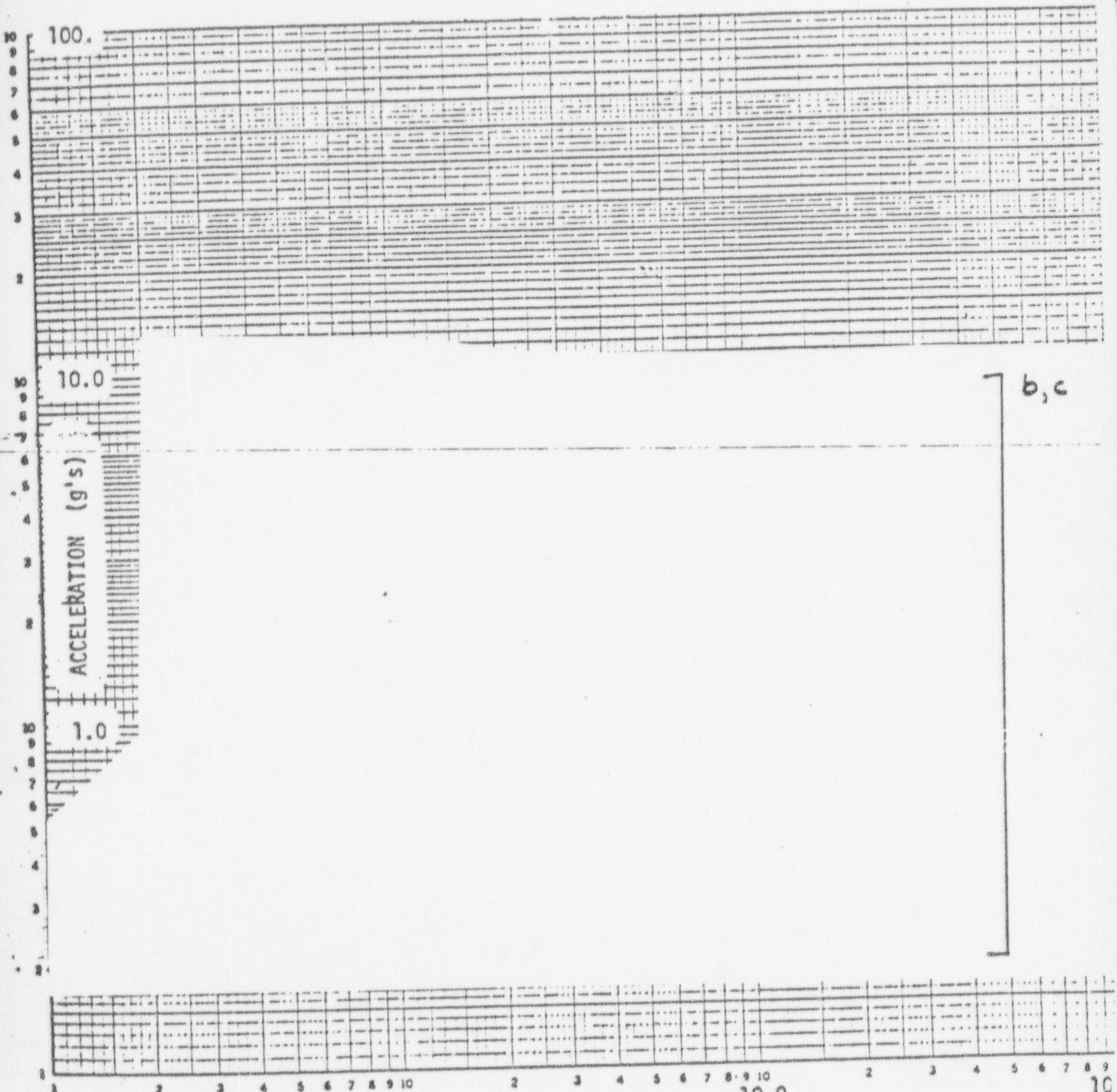


Control Accelerometer
SPAN #2 - 5.0
6-3-78

Position 1 Run 1
0° DAMPING 5%

Fig. 3

INPUT B (OBE)

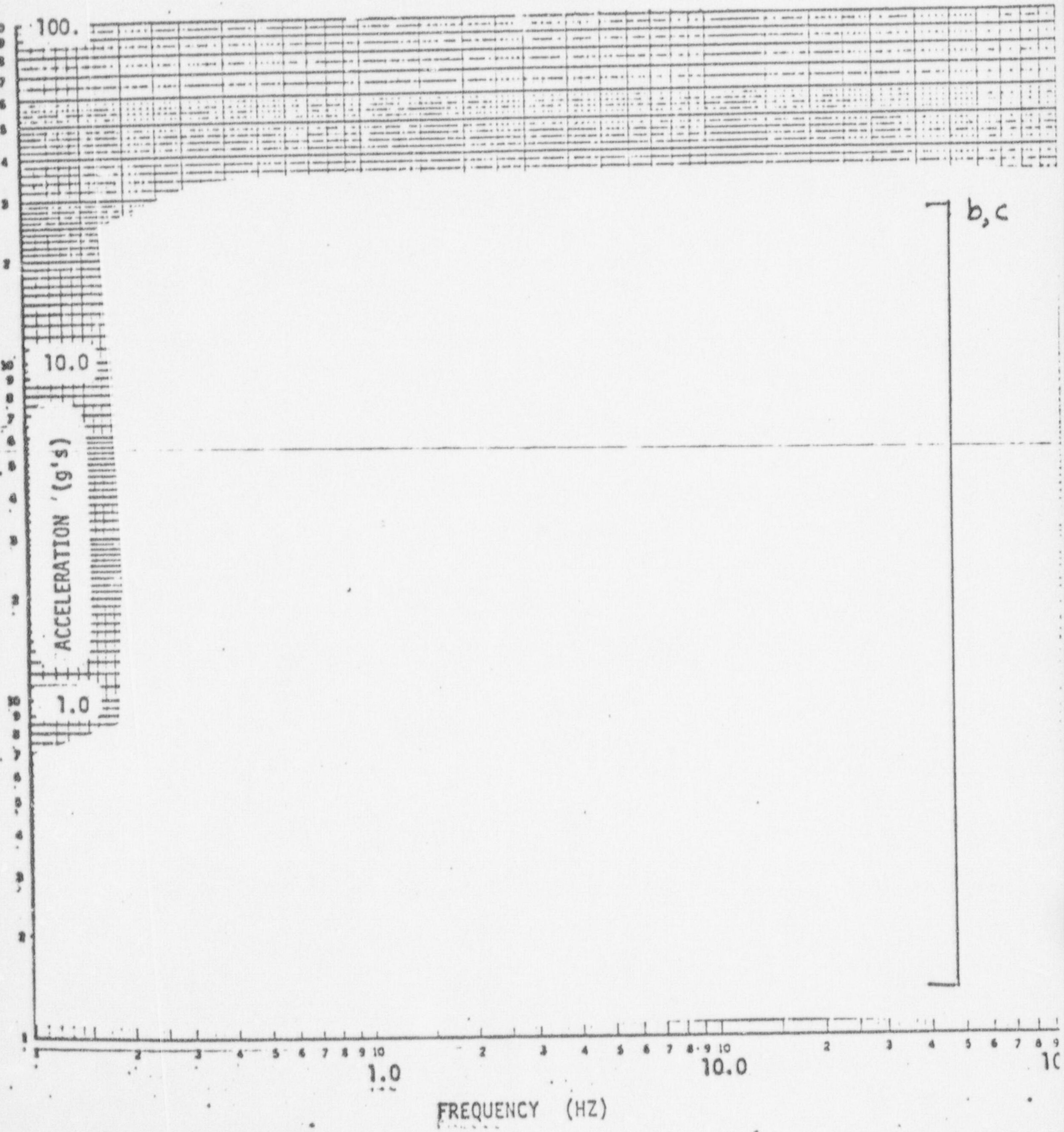


Control Accelerometer
SPAN #2 - 5.0
6-3-78

Position 1/ Run 4
0° DAMPING 5%

Fig. 4

INPUT B (OBE)

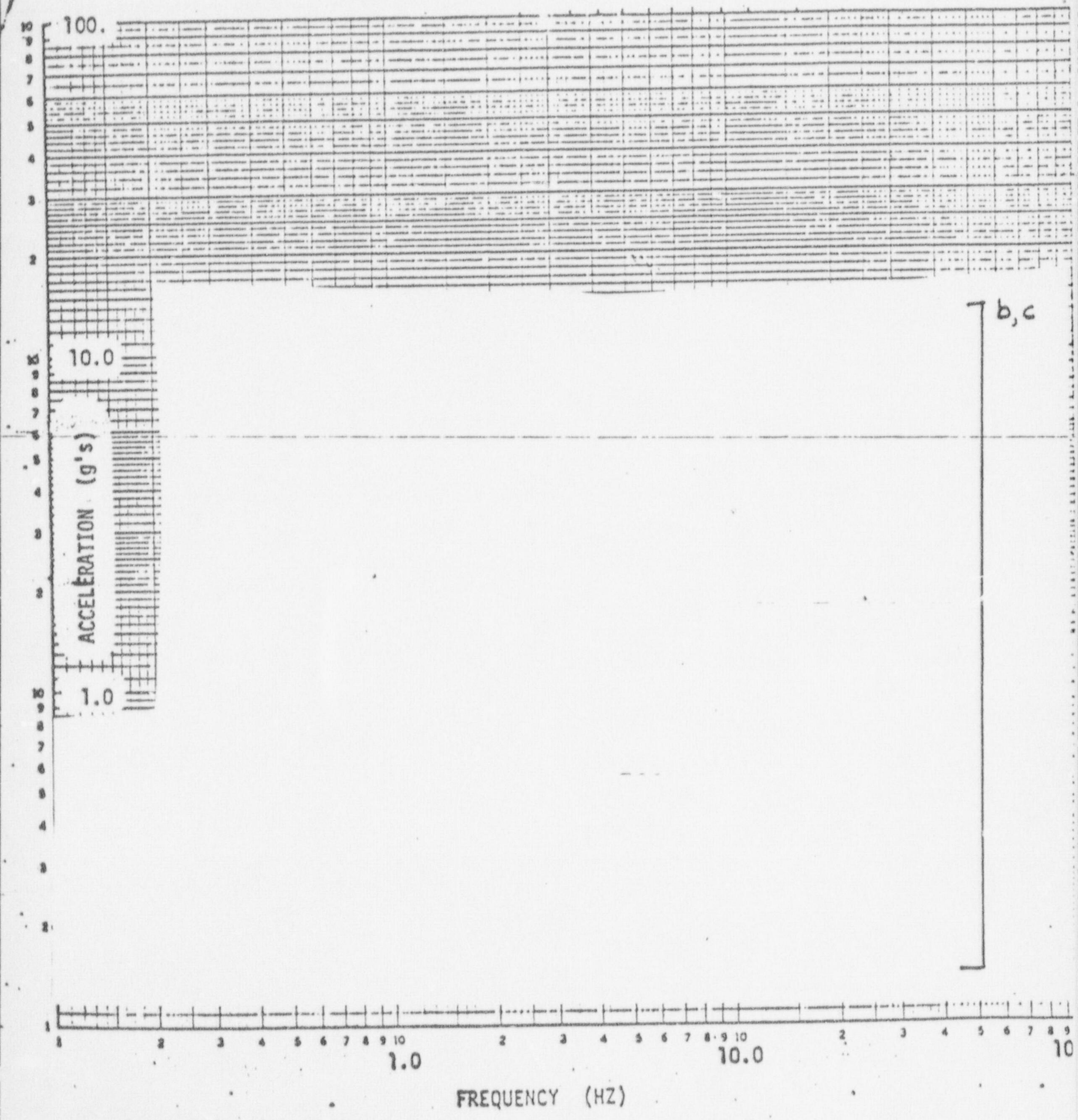


Control Accelerometer
SPAN #2 - 5.0
6-3-78

Position 1 Run 5
0° DAMPING -5%

Fig. 5

INPUT B (OBE)



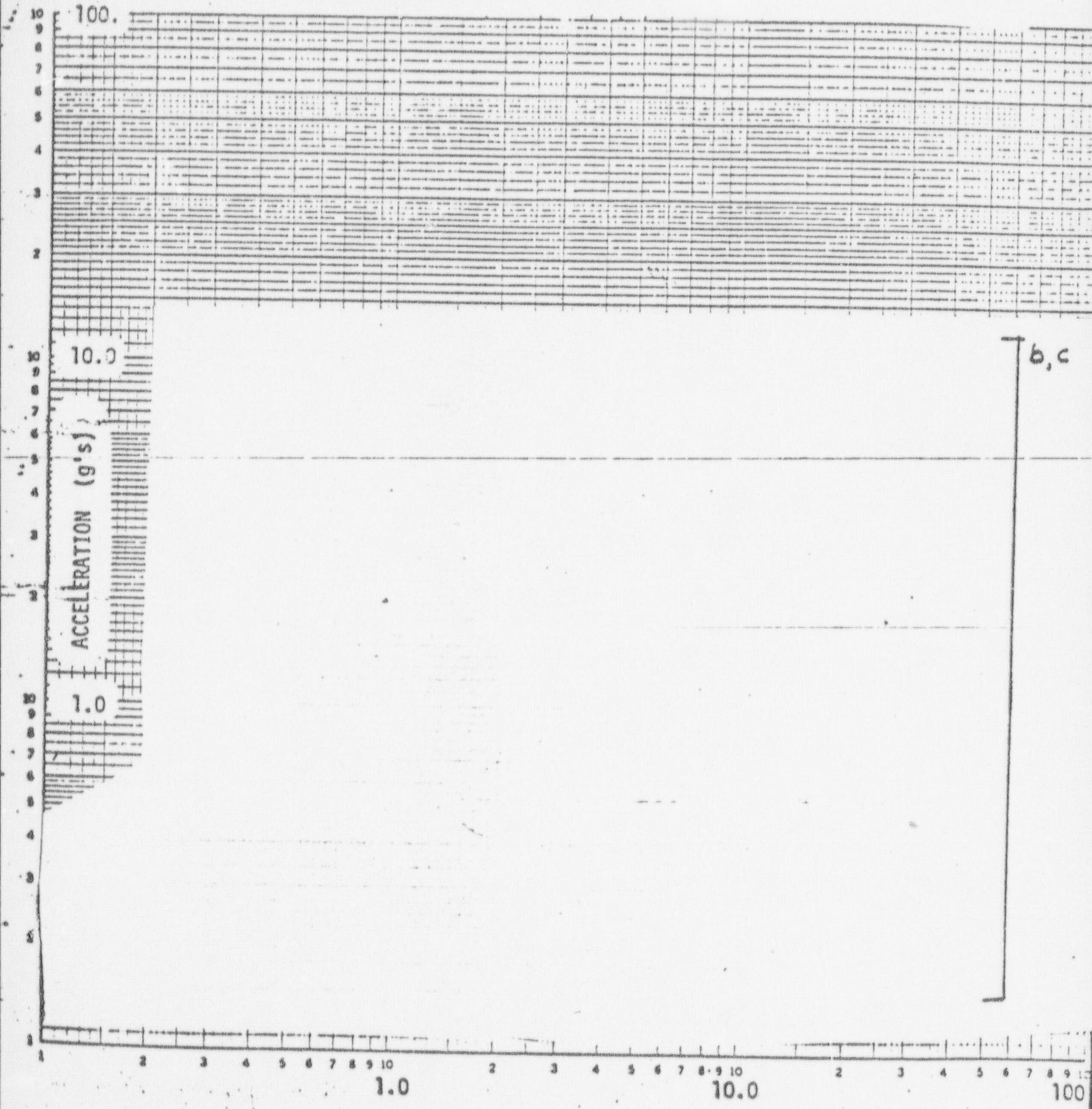
Control Accelerometer
SPAN #2 · 5.0 -
6-5-78

Position 1' Run 6
0° DAMPING 5%

FiG. 6

INPUT B (OBE)

ACCPETABLE OBE #5

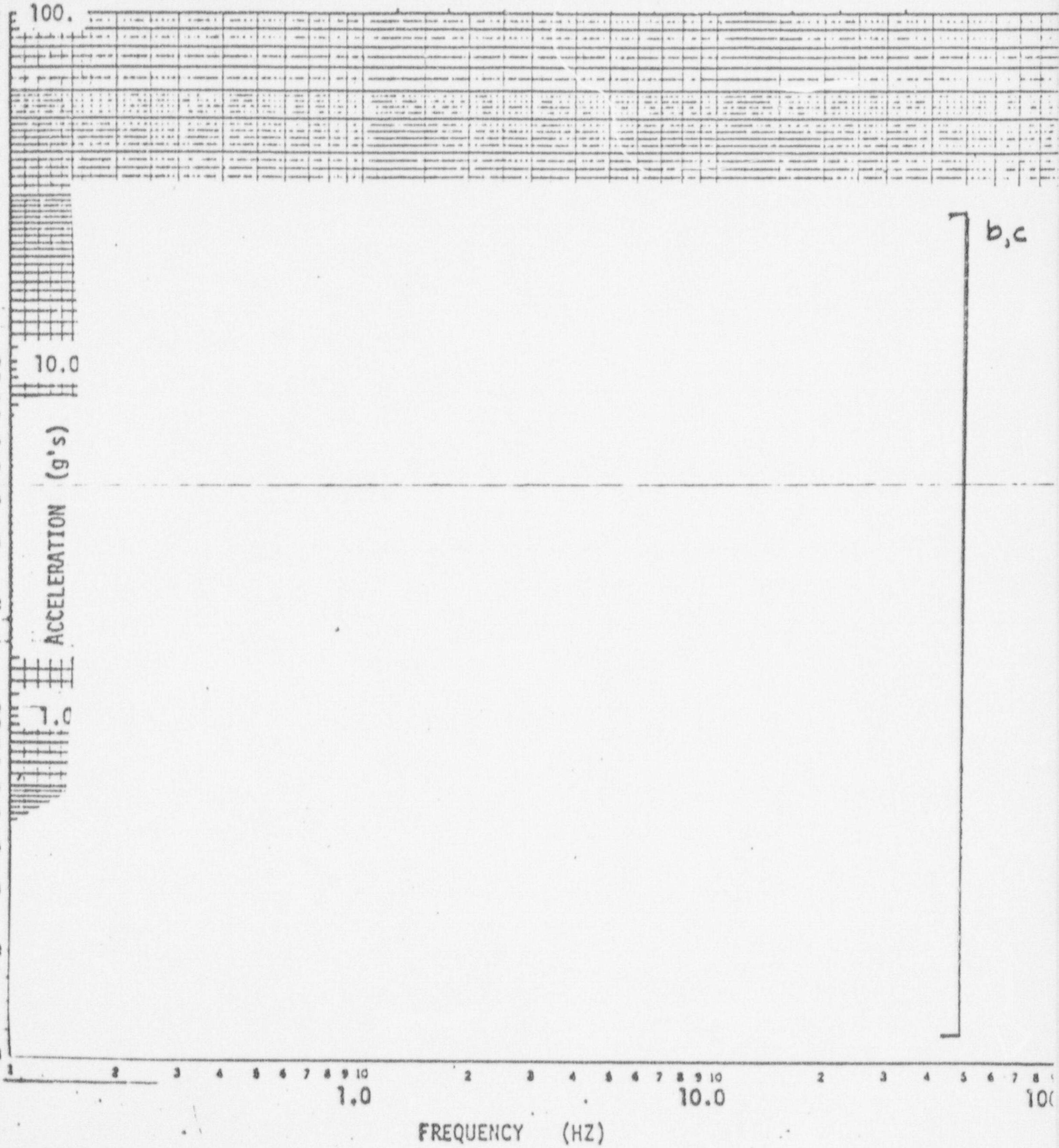


Control Accelerometer
6-5-78
SPAN #2 - 5.0

Position 1 Run 7
0° DAMPING 5%

Fig. 7

INPUT A (SSE)



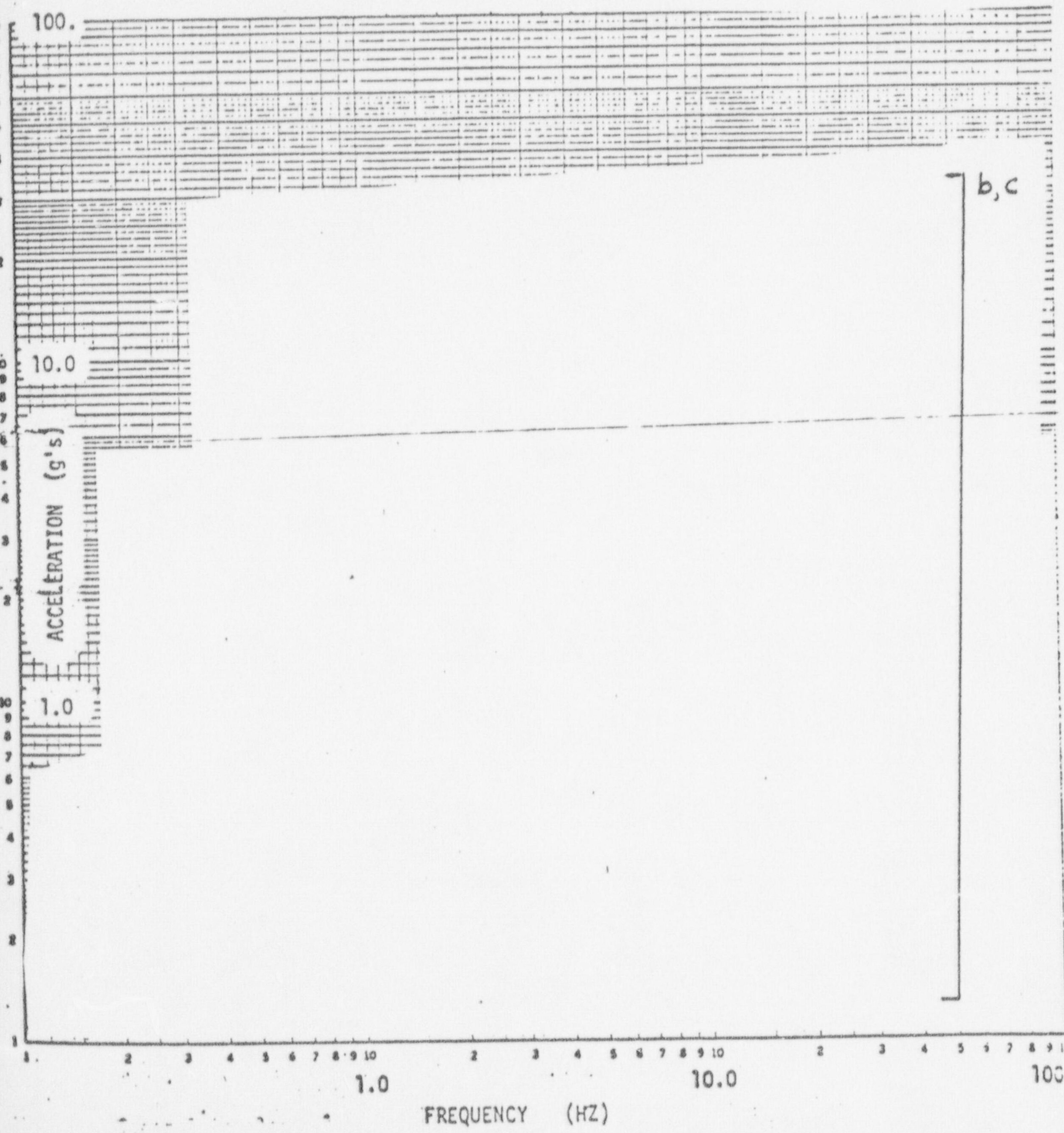
Control Accelerometer
6-5-78
SPAN #2 - 9.5

Position V Run 10
0° DAMPING 5%

FIG. 8

ACCEPTABLE SSE

INPUT B (SSE)



Control Accelerometer

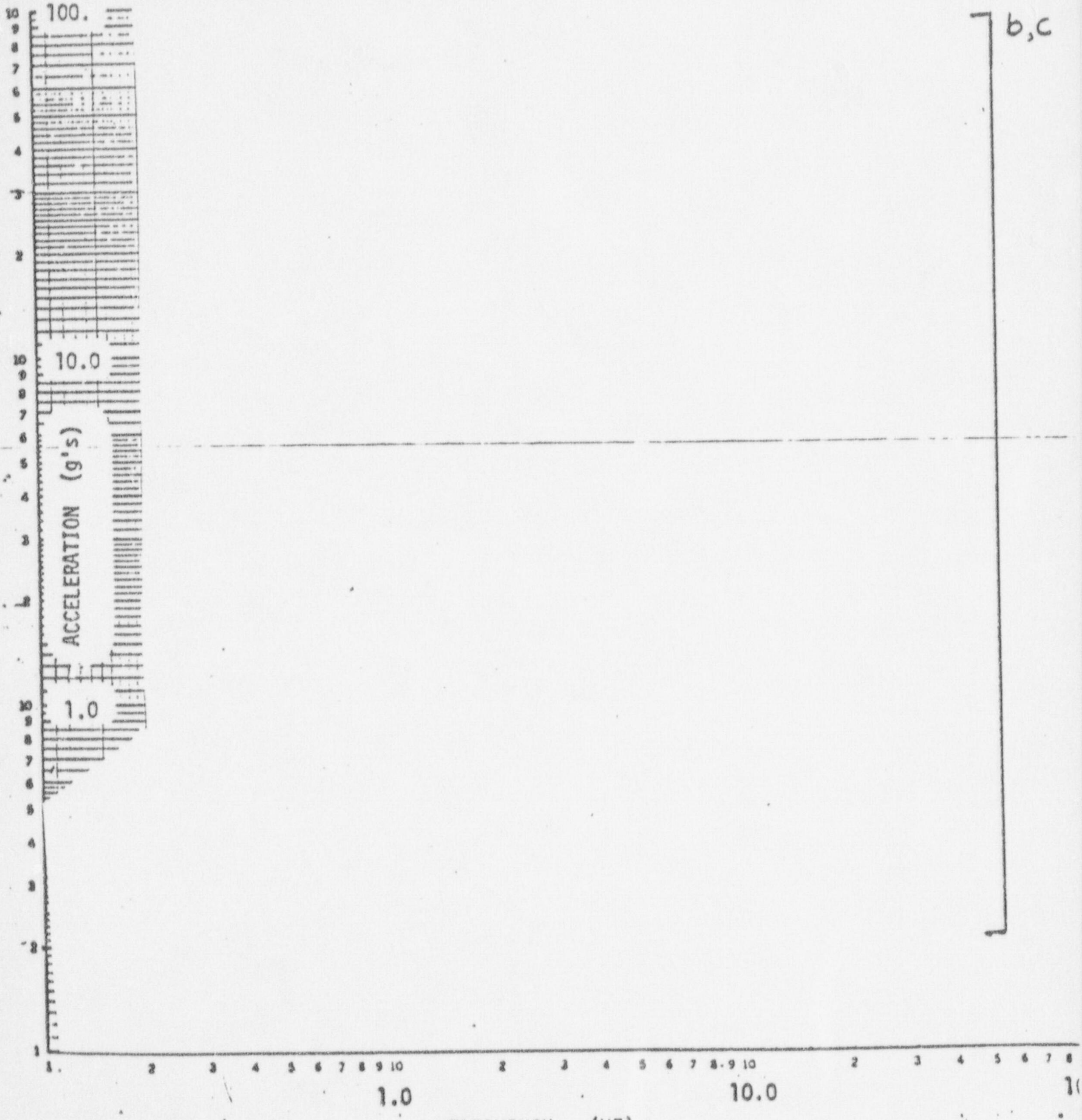
6-5-78

Position 1 Run 8

0° DAMPING 5%

Fig. 29

INPUT C (SSE)

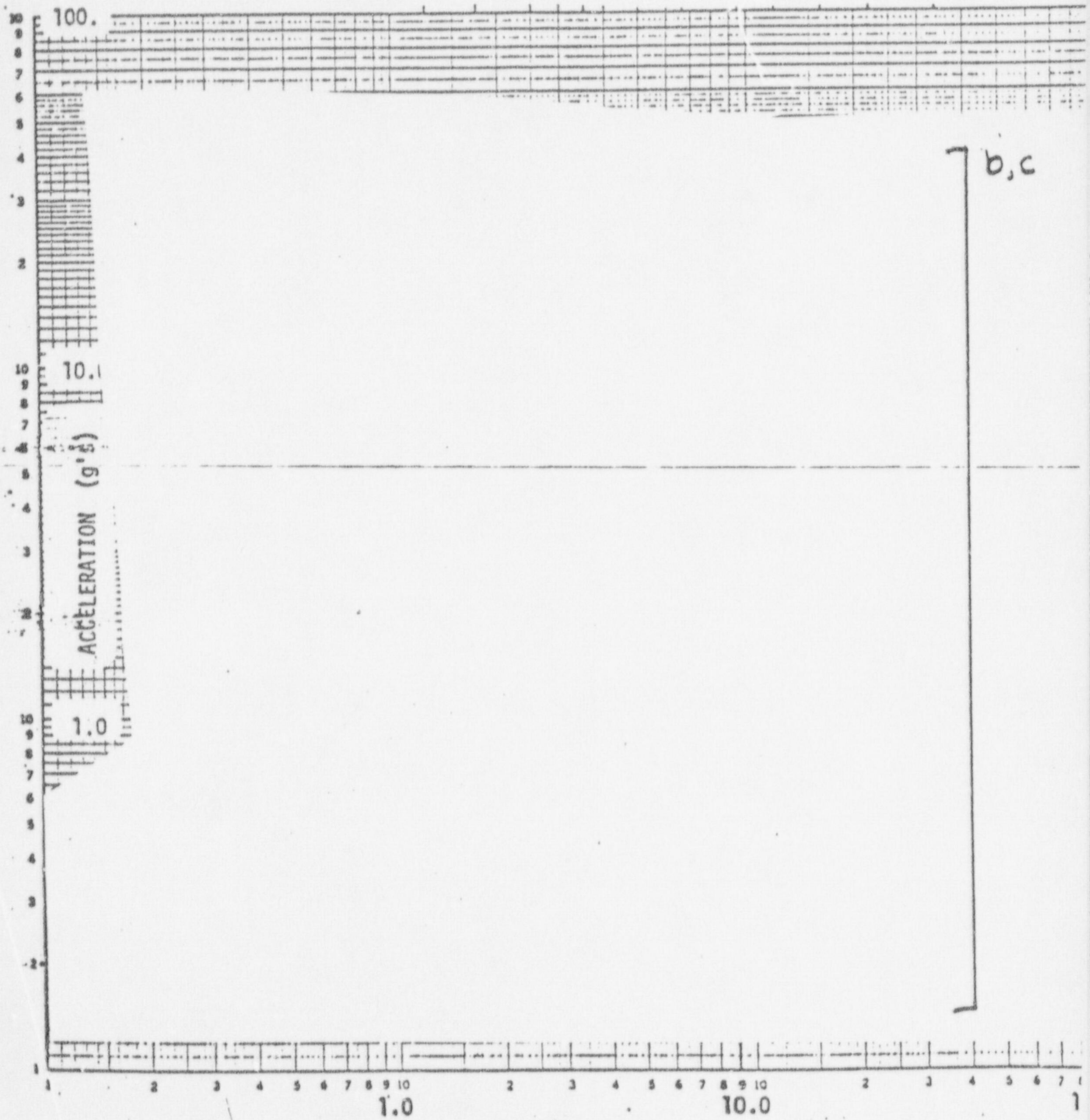


Control Accelerometer
6-5-78
SPAN #2 - 9.0

Fig. $10

Position 1 Run 9
0° DAMPING 5%

INPUT A (SSE)



Control Accelerometer

Position 2 Run 11

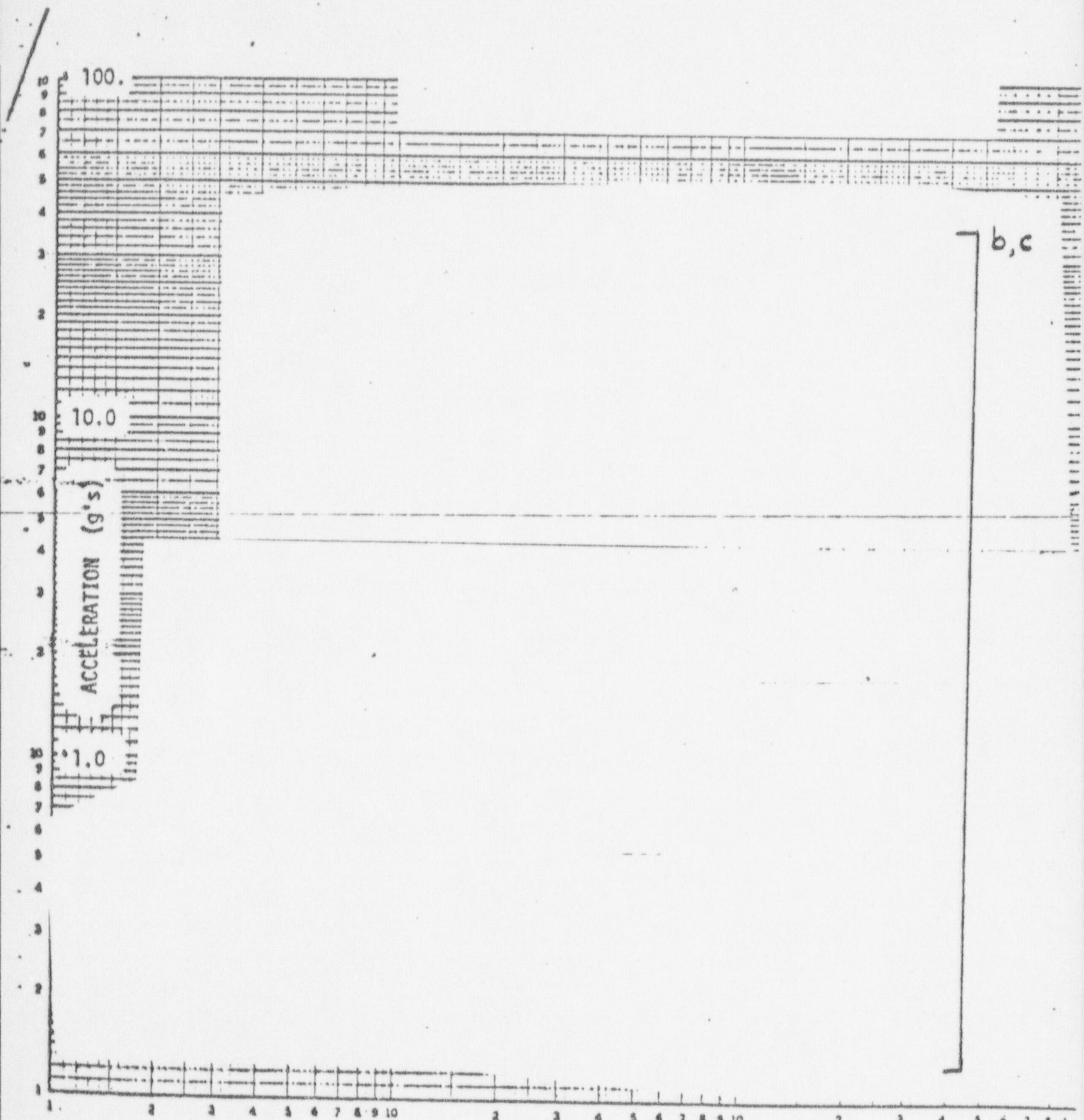
6-5-78

270° DAMPING 5%

SPAN - 9.5

Fig. 1A

INPUT B (SSE)



Control Accelerometer

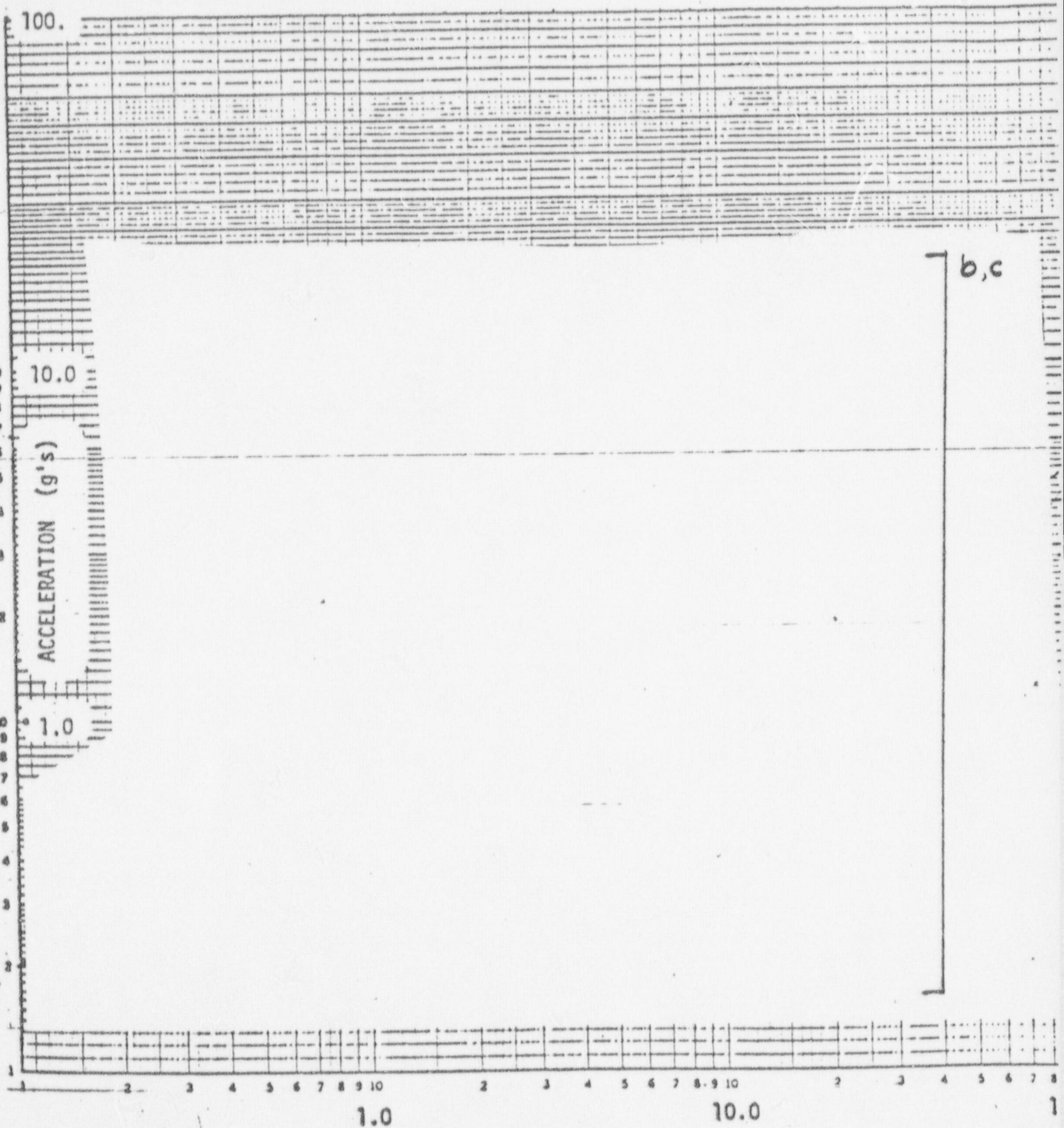
6-5-78
SPAN - 9.9

Position 2 Run 12
270° DAMPING 5%

FiG. 12

ACCEPTABLE SSE

INPUT C (SSE)

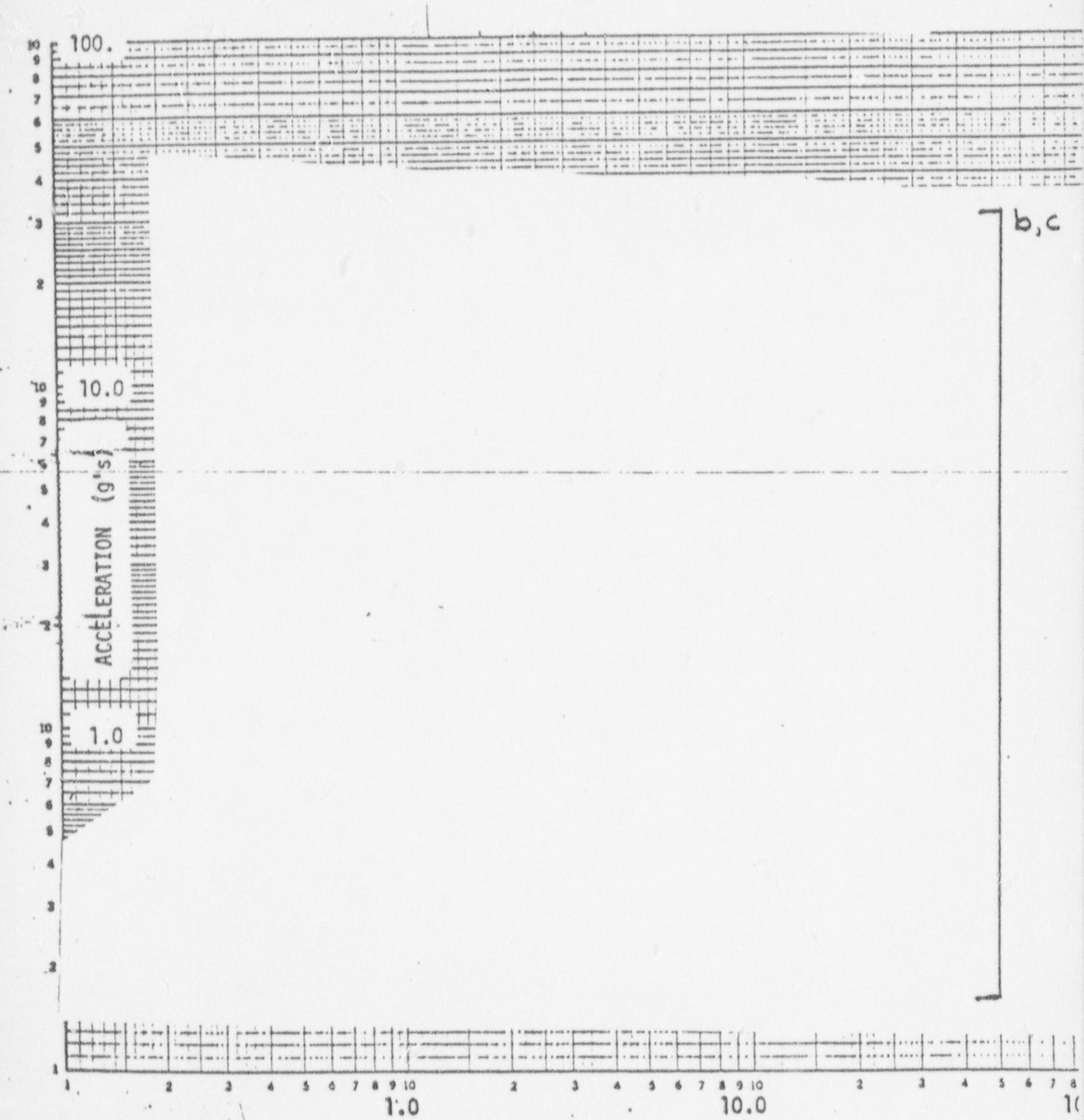


Control Accelerometer
6-5-78
SPAN #2 - 9.0

Position 2 Run 13
270°
DAMPING 5%

Fig. 13

INPUT A (SSE)



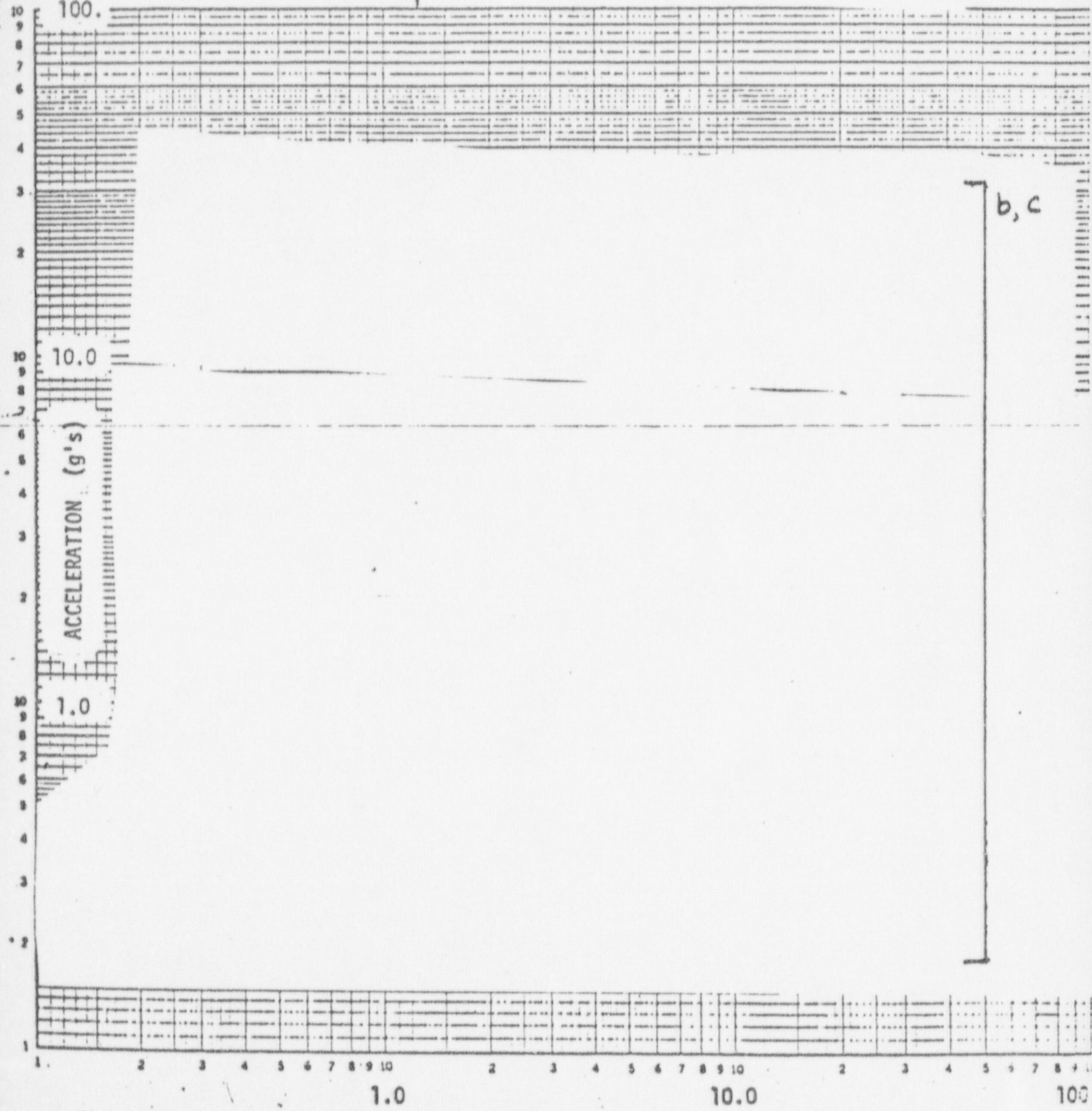
Control Accelerometer
6-5-78
SPAN #2 - 9.5

Position 3 Run 17
180°
DAMPING 5%

Fig. 14

ACCEPTABLE SSE

INPUT B (SSE)



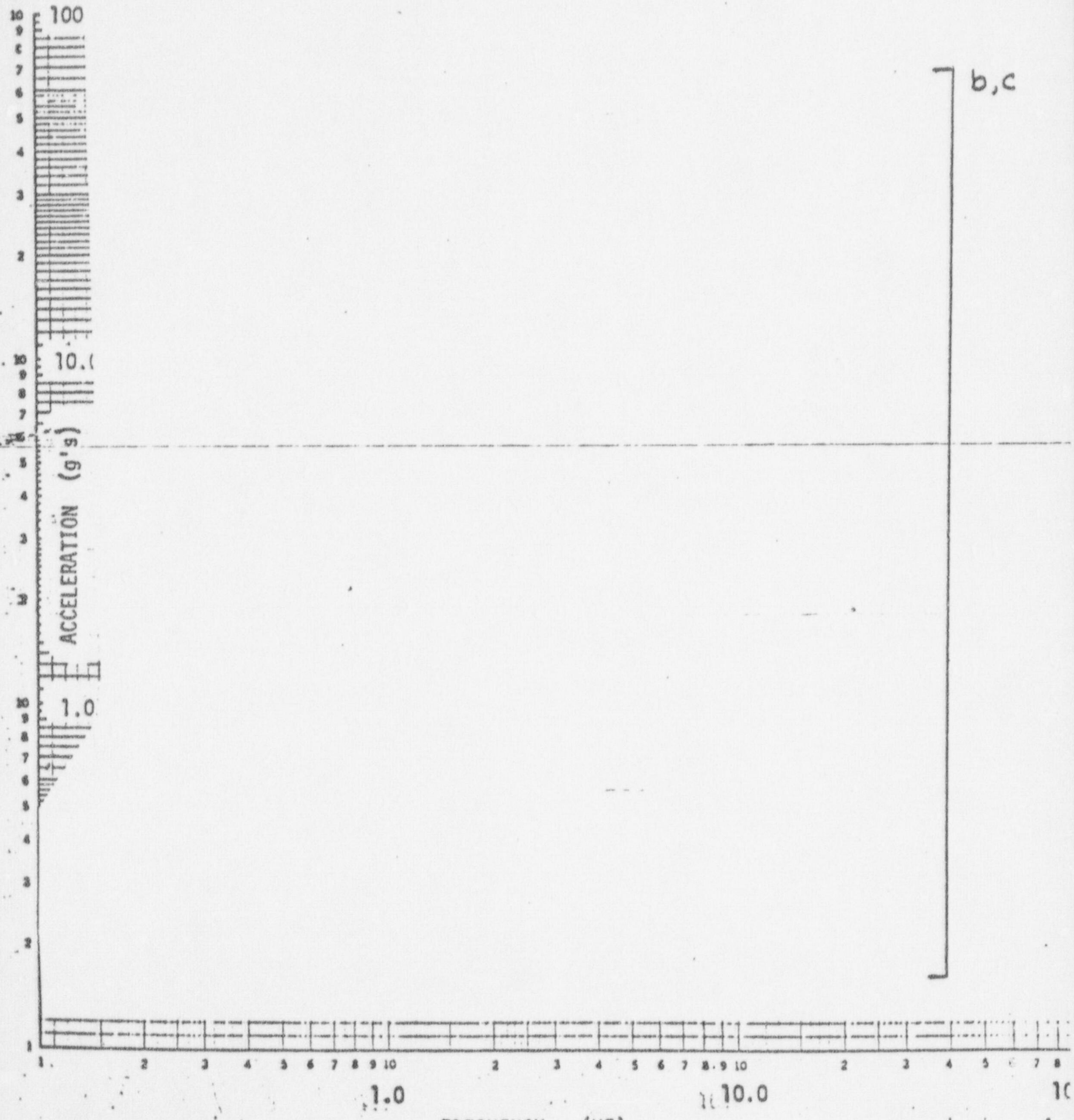
FREQUENCY (HZ)

Control Accelerometer

Position 3 Run 18
180°
DAMPING 5%

6-5-78
SPAN #2 - 9.9

INPUT C (SSE)



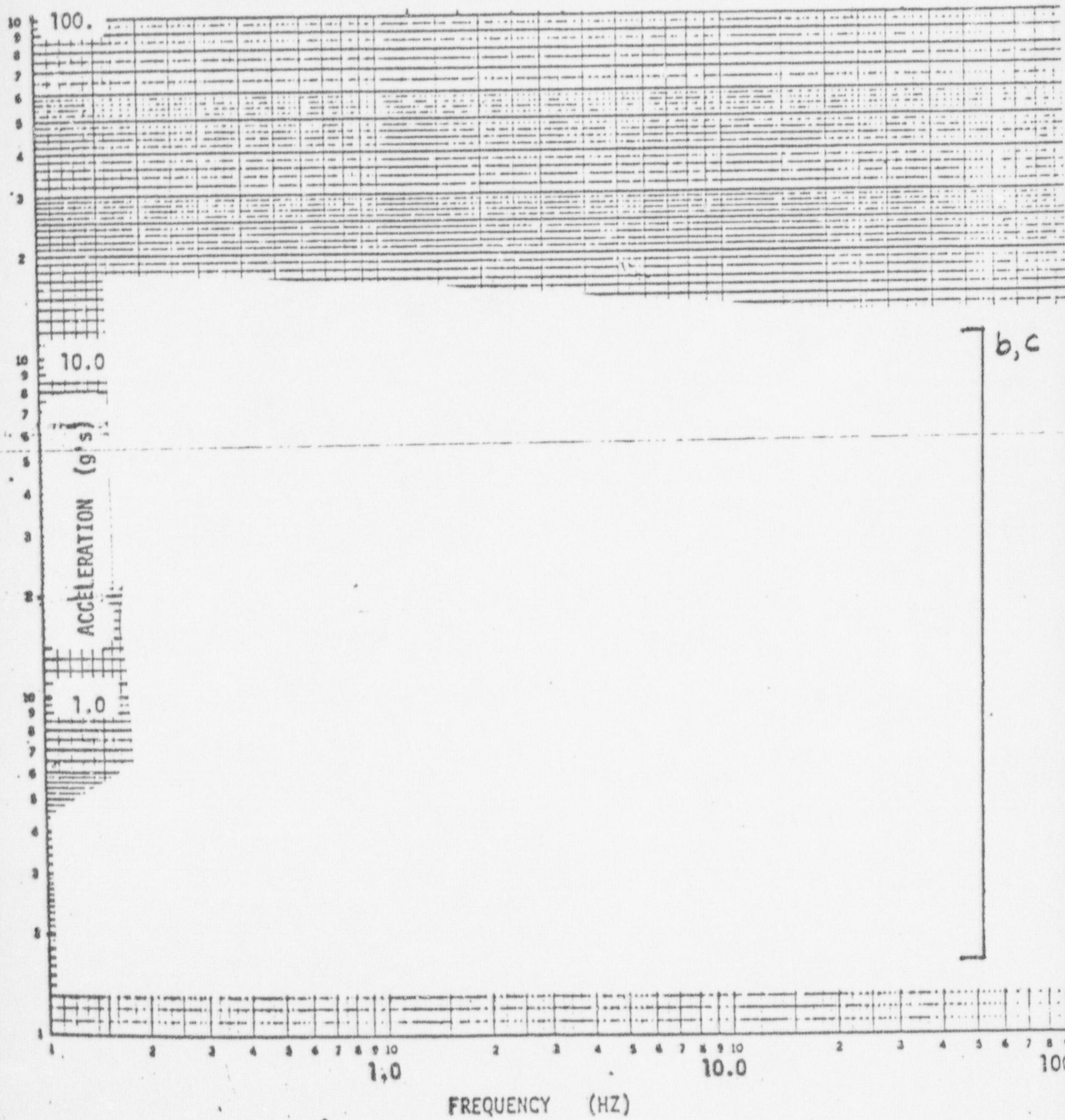
Control Accelerometer

6-5-78
SPAN #2 - 9.0

Fig. 15

Position 3 Run 20
180°
DAMPING 5%

INPUT A (SSE)



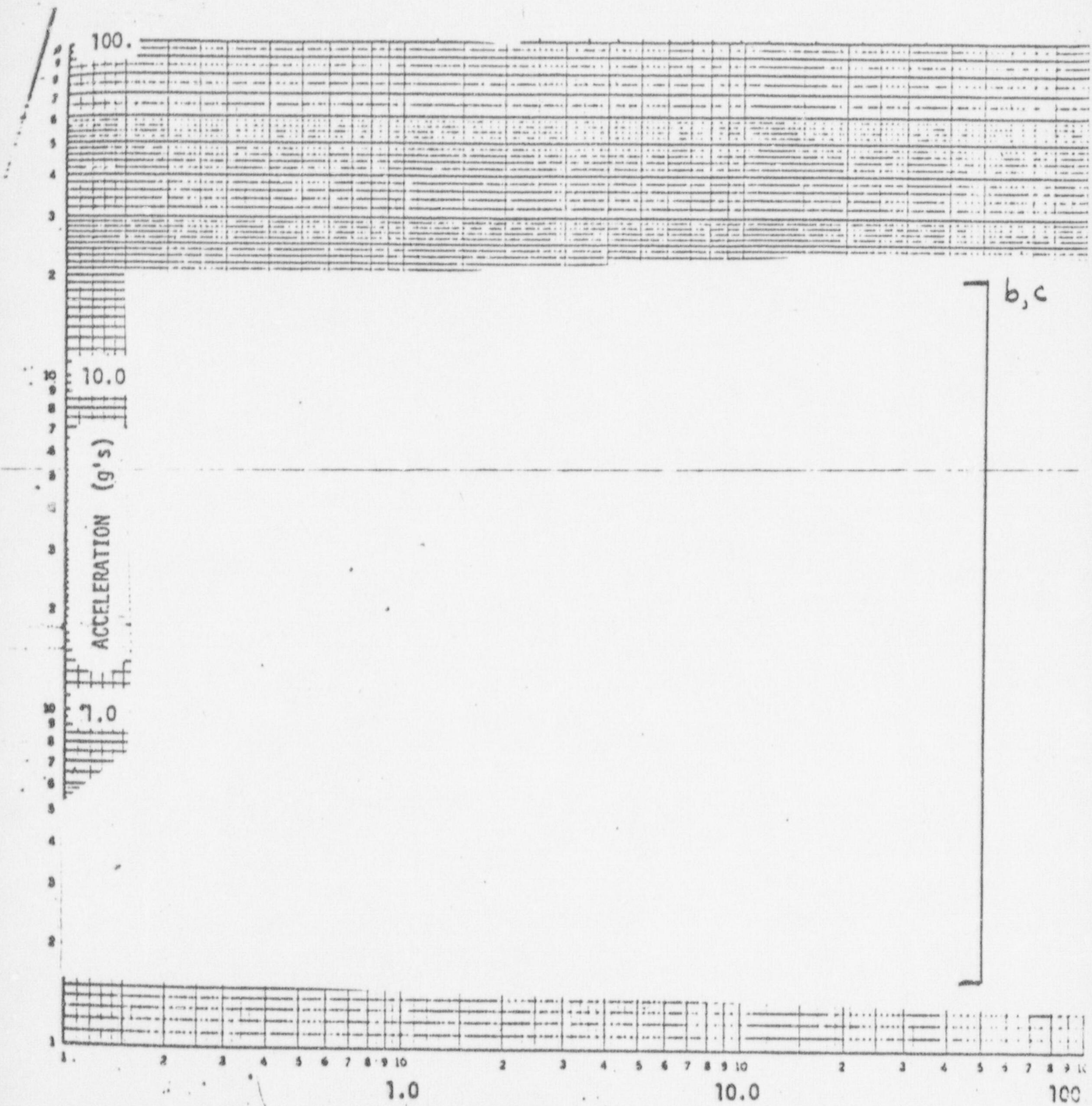
Control Accelerometer

6-5-78
SPAN #2 - 9.5

FIG. 18

Position 4 Run 16
90°
DAMPING 5%

INPUT B (SSE)



Control Accelerometer

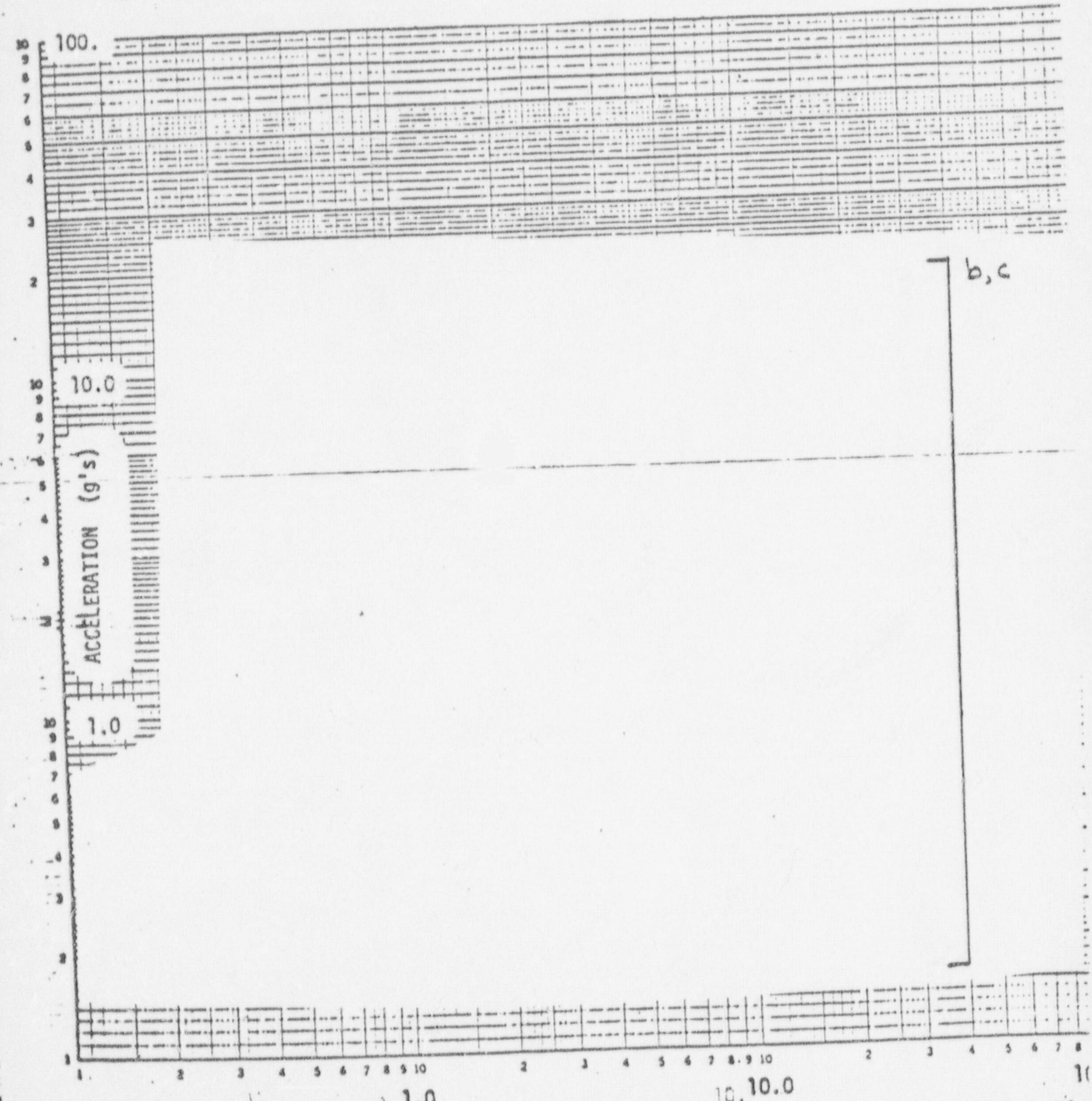
Position 4 Run 15

6-5-78
SPAN #2 - 9.9

90°
DAMPING 5%

FIG. 18

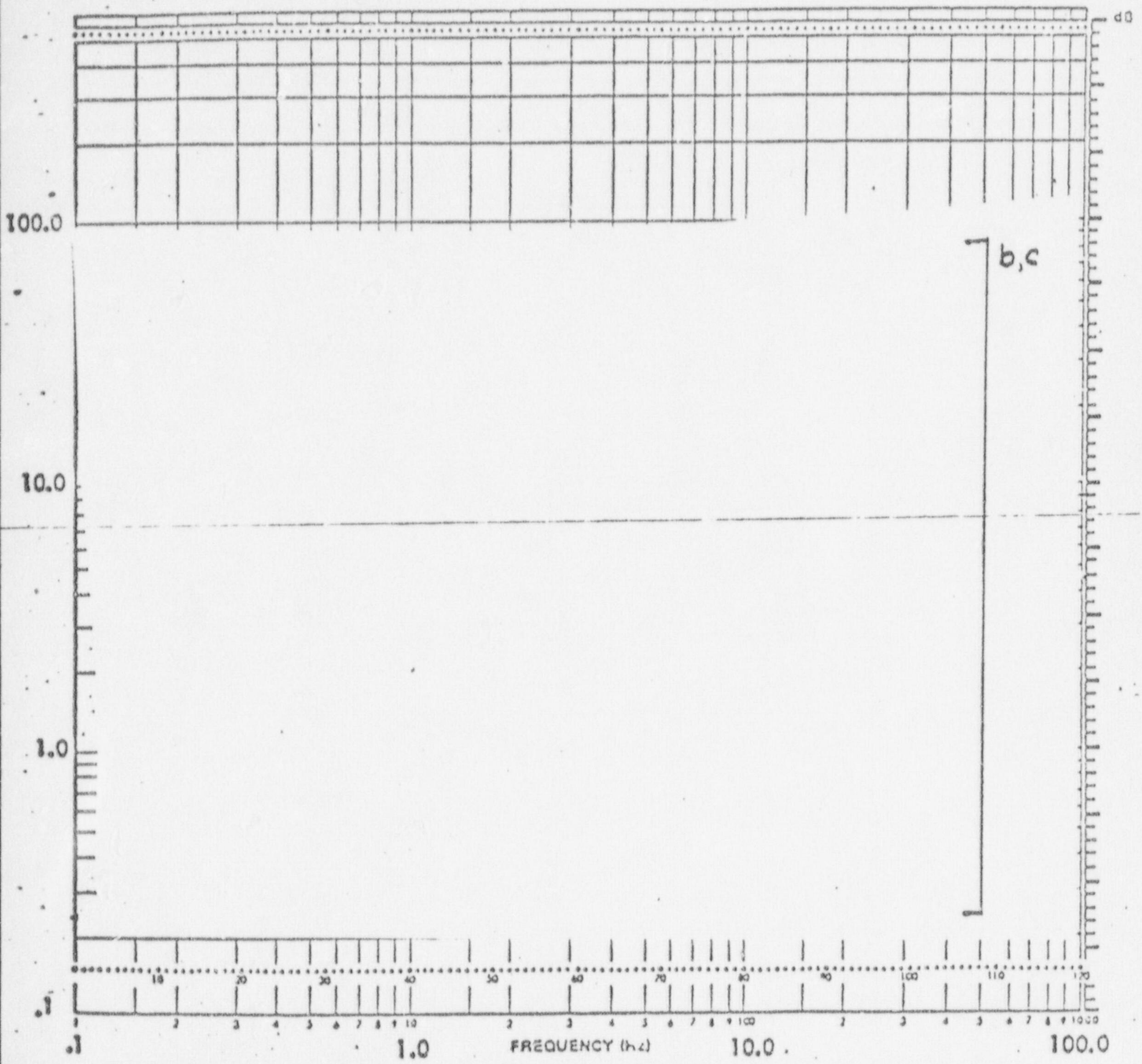
INPUT C (SSE)



Control Accelerometer
6-5-78
SPAN #2 - 9.0

Position 4 Run 14
90°
DAMPING 5%

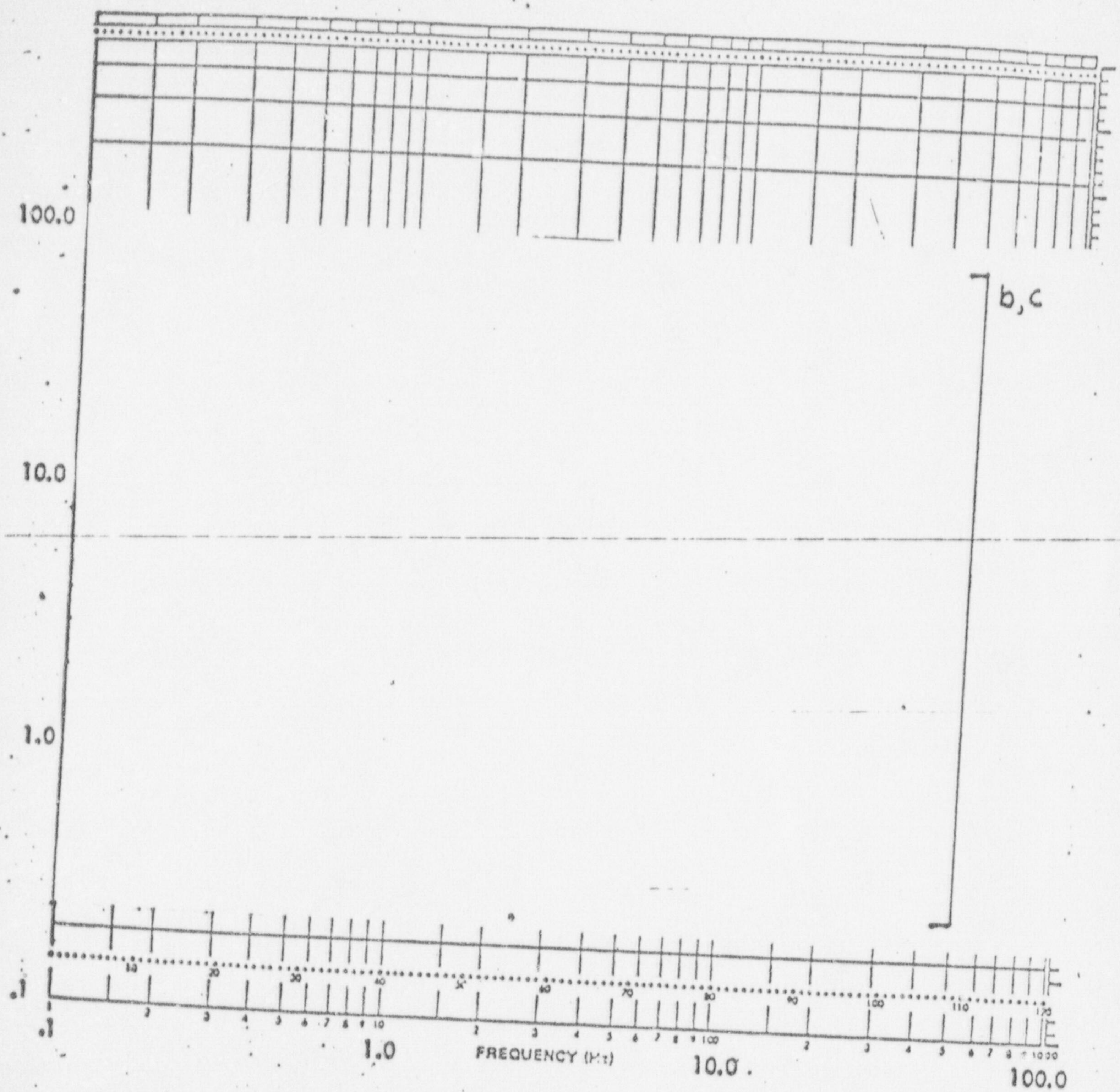
Fig. 19



REQUIRED RESPONSE SPECTRUM (RRS)

OPERATING BASIS EARTHQUAKE (OBE)

Fig. 20



REQUIRED RESPONSE SPECTRUM (RRS)

SAFE SHUTDOWN EARTHQUAKE (SSE)

Fig. 21

QUESTION 6 Seismic Qualification: Process Control and Protection Equipment

The Process Control and Protection equipment contains signal conditioning equipment for monitoring pressurizer water level and pressure, containment pressure, reactor coolant flow and temperature, and steam generator water level and pressure, etc.

a) Confirm that the process control and protection equipment referenced in Section 10.3.9 of the FSAR Amendment 50, and page 3.10-6 of the FSAR is the same as Westinghouse CID Process Equipment referenced in WCAP-8021 Section 2-4.

b) Westinghouse committed to retesting entire typical channels of the process control and protection equipment (including signal conditioning circuits and bistables) to verify that the bistables have the capability to change state during a seismic event. Section 10.3.19.1 of the FSAR Amendment 50 implies that only bistablers have undergone additional testing versus an entire typical channel. Justify that the retesting of only bistables demonstrates the seismic adequacy of the process control and protection equipment.

RESPONSE

a) The process control and protection equipment used in the Diablo Canyon plant is the Westinghouse CID 7100 Process Equipment. This is the same equipment discussed in Section 10.3.9 of the FSAR Amendment 50 and page 3.10-6 of the FSAR.

b) Entire typical channel of the process control and protection equipment were tested. The FSAR will be revised to clarify this.

QUESTION 7 Seismic Qualification: Reactor Trip Switchgear

This equipment consists of two circuits breakers in series which interrupt power to the control rod drives. This interruption of power releases the rods, which fall by gravity to shut down the nuclear reactor.

The basis for determining the functional integrity of the equipment (as indicated in WCAP-7821 supplement #4) was that all breaker outputs, including secondary contact outputs to the various protection systems, electrically maintain proper contact condition of open or closed position. It appears that the capability of the contacts to change position during a seismic event was not tested. Provide justification for monitoring only proper contact conditions of open or closed versus test with contacts open, with contacts closed, and with contacts changing position.

RESPONSE

The primary function of the circuit breakers is to interrupt power and therefore (trip) release the rods. This function was checked during and after the seismic testing, and found to be acceptable. The secondary contacts are used to maintain normal plant control and therefore were monitored during the testing. Once the primary function (trip) was performed, the secondary contacts have no consequence on the operation (trip) of the system. However, the outputs from the breaker's secondary contacts are supplied to various protection systems to provide for safety injection block logic, feedwater isolation logic and turbine trip logic. These iputs and outputs were continuously monitored during the testing sequence and are shown schematically in WCAP-7821 Supplement #4 in figure 4. Therefore, the capability of the contacts to change position during a seismic event was tested.

QUESTION 8 Seismic Qualification: Solid State Protection System

The solid state protection system provides reactor trip and/or engineered safety feature action. The equipment tested consists of three cabinets and represent one logic train of the protection system. The input cabinet containing relays, the logic cabinet, and the output cabinet containing master and slave relays.

a) The solid state protection system also consists of process instrumentations bistables and field contacts that appear not be contained in the three cabinets tested as indicated in Section 10.3.22 of the FSAR Amendment 50. Describe the seismic qualification for the subject process instrumentations bistables and field contacts.

b) The functional integrity of the solid state protection system was demonstrated, as indicated in Section 10.3.22 of the FSAR Amendment 50, contacts that provide signals for undervoltage trip, train trouble, and safety injection. Justify how the functional integrity of the solid state protection system is demonstrated by only monitoring three relay contacts.

c) Provide the seismic qualification test results which demonstrates the electrical functionability for the relays located in the input cabinet and for the master relays located in the output cabinet of the solid state protection system.

d) Provide the seismic qualification test results which demonstrate the electrical functionability of the solid state protection system logic cabinet.

RESPONSE

a) Not True - Process instrumentation bistables are contained in the Process Control System equipment and have been seismically qualified. See WCAP-8021, Section 2-4 and WCAP-8828.

b, c, & d The functional integrity of the system was demonstrated during the simulated seismic event as follows: Eight simulated input signals were fed into the relays of the four compartments of the input cabinet, four to initiate a reactor trip condition and four to initiate a safety injection condition. The contacts of the input relays were wired to the Logic Cabinet where one group of four contacts were connected to a 2/4 logic circuit to form a reactor trip signal, and the second group of four contacts were connected to another 2/4 logic circuit to form a safety injection signal. The reactor trip signal coming out of the logic cabinet, was a 48 volt d.c. voltage signal and was connected to an undervoltage coil assembly, identical to one used in the reactor trip switchgear. The reactor trip signal was also connected to a relay, where contacts were recorded. The safety injection signal coming out of the logic cabinet energizes the master relays in the output cabinet, which in turn energizes the slave relays also located in the output cabinet. Contacts from the slave relays were monitored by recorders to ascertain correct action.

Before each test all eight input signals were present, setting the circuitry in a pre-trip condition. During the actual shaking, two input signals, in each group of four, were turned off simulating a 2/4 condition, which were monitored by recorders. Thus, the input relays, logic circuitry, and master and slave relays were demonstrated to function properly before, during, and after each simulated seismic event.

QUESTION 9 Seismic Qualification: Resistance Temperature Detectors

Resistance temperature detectors sense the temperature in the main coolant loops.

a) Section 3.10 of the FSAR and 10.3.2.8 of the FSAR Amendment 50 do not provide descriptive information as to this safety function of resistance temperature detectors installed at Diablo Canyon. Provide descriptive information.

b) Identify by manufacturer and model number Class 1E Resistance Temperature Detectors (RTD) being used at Diablo Canyon.

c) Section 10.3.27 of the FSAR Amendment 50 implies that a much more severe function-verification test was performed on resistance temperature detectors than was reported in WCAP-8234A, Seismic testing and Functional Verification of By-Pass Loop Reactor Coolant RTD's. For this much more severe test, provide the test set up details and test results.

d) Verify that RTD's at Diablo Canyon are installed in the Reactor Coolant By-Pass Loop.

RESPONSE

a) The Narrow Range RTD's provide the following safety function trips:

Overtemperature ΔT

Overpower ΔT

Lo-Lo T_{avg} coincident with high steam line flow

The Wide Range RTD's provide Post Accident Monitoring.

b) Narrow Range RTD's - Sostman Model # 11834B-1

Wide Range RTD's - Sostman Model # 11901B

c) WCAP-8234A discusses both the seismic test and the more severe functional verification test performed on RTD's. Implication that this second test is in addition to testing discussed in the WCAP is incorrect. The FSAR will be revised for clarity.

d) At Diablo Canyon the Narrow Range RTD's are installed in the reactor coolant By-Pass Loop; the Wide Range RTD's are installed directly into the main coolant piping through the use of thermal wells.

QUESTION 10 Seismic Qualification: Safeguards Test Cabinet

Selected relays, switches, and components were continuously monitored during seismic testing as indicated in WCAP-8021, Supplement 1 Seismic Testing of Electrical and Control Equipment (Engineered Safeguards test Cabinet for PG&E Plants), May 1977.

Provide electrical schematic diagrams of the test cabinet circuitry, describe the test set up, and identify the selected relays, switches, and components monitored during testing. Justify the seismic adequacy of relays, switches, and components that were not monitored during seismic testing.

RESPONSE

Figure 4 shows the electrical test setup for monitoring selected switches, relays, and resistor-light-diode combinations of the Safeguards Test Cabinet during its seismic test. You will note that normally open and normally closed contacts of switches S804, S807, S818 and S821 were monitored, as were normally open and normally closed contacts of relays K801, K804, K811, K821 and K822. Two light-diode combinations, DS8038 and DS8040 were also monitored for continuity. Component location is shown in Figure 5.

Switches located in the top row (middle and side) and 3rd row (middle) were monitored. Relays located in the top row (side and middle), 2nd row (middle) and bottom row (side) were monitored.

The switches, relays and resistor-light-diode combinations that were not monitored during the seismic tests are identical to the ones that were monitored, therefore are considered seismically adequate. Note that the locations of the components monitored are in areas of expected highest acceleration, i.e., middle of panel, top of panel.

Schematic diagram 1080415 (Sheets 1-12) is furnished to enhance the understanding of the Safeguards Test Cabinet circuitry.

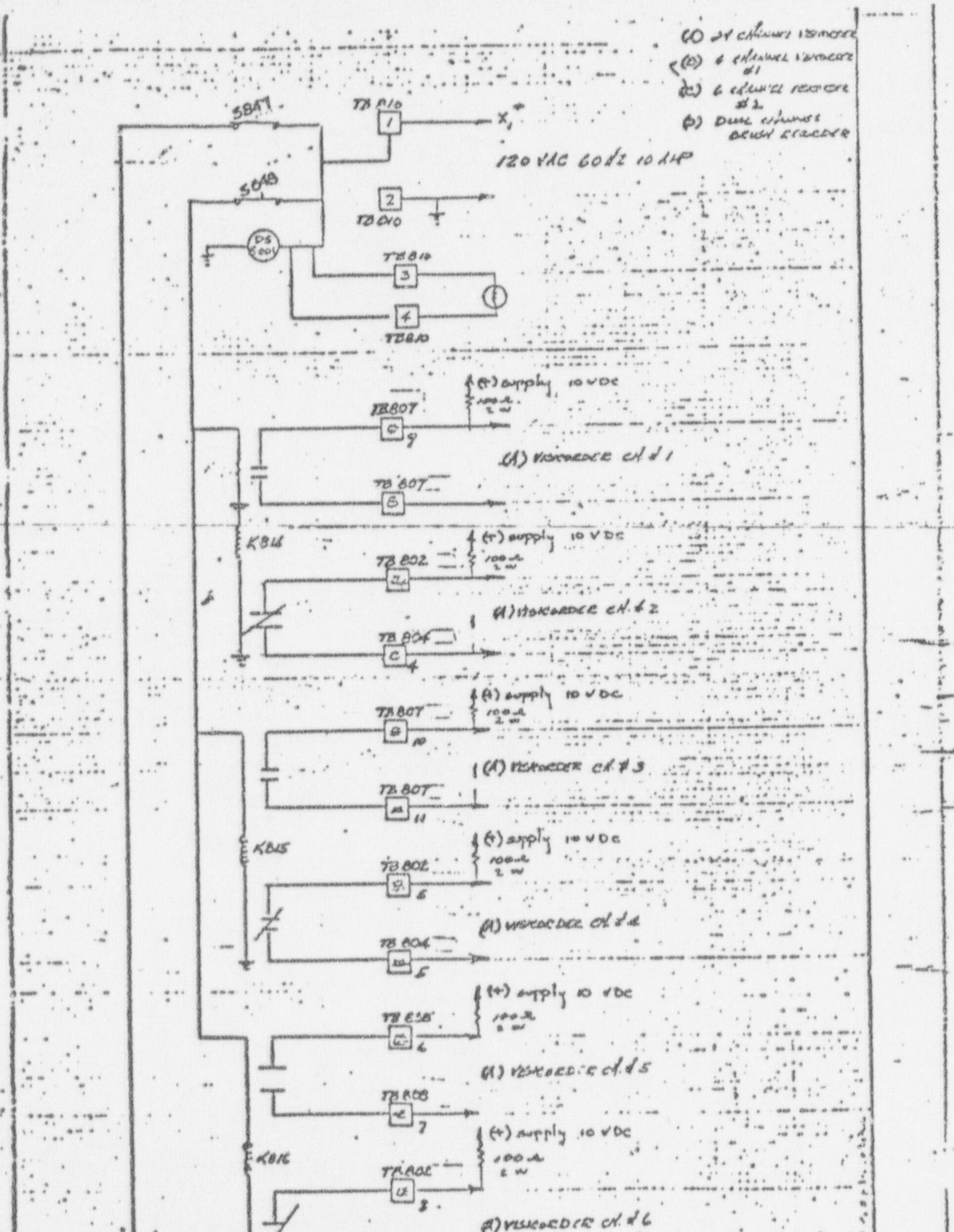


FIGURE 4 (cont'd)

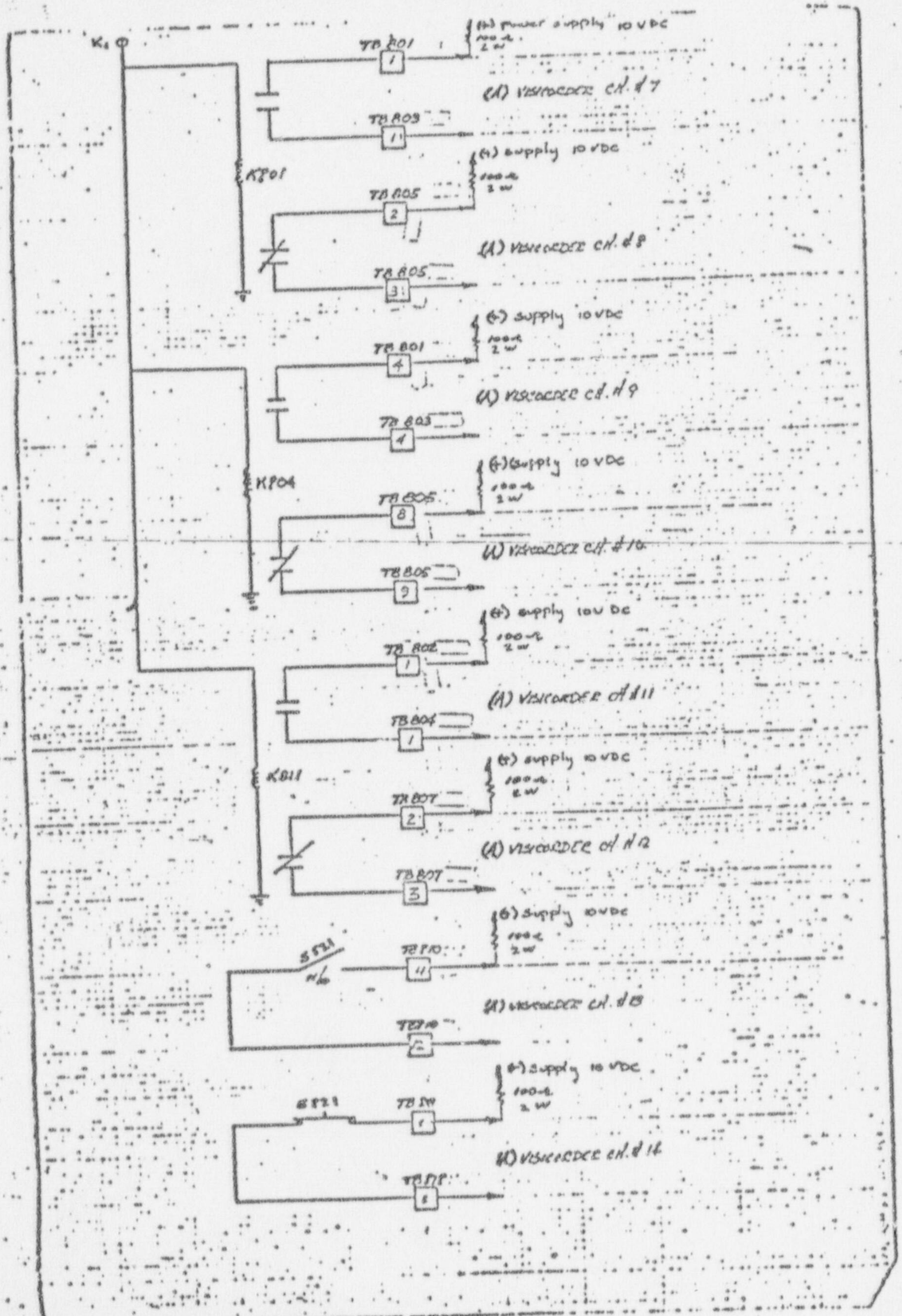


FIGURE 4 (cont'd)

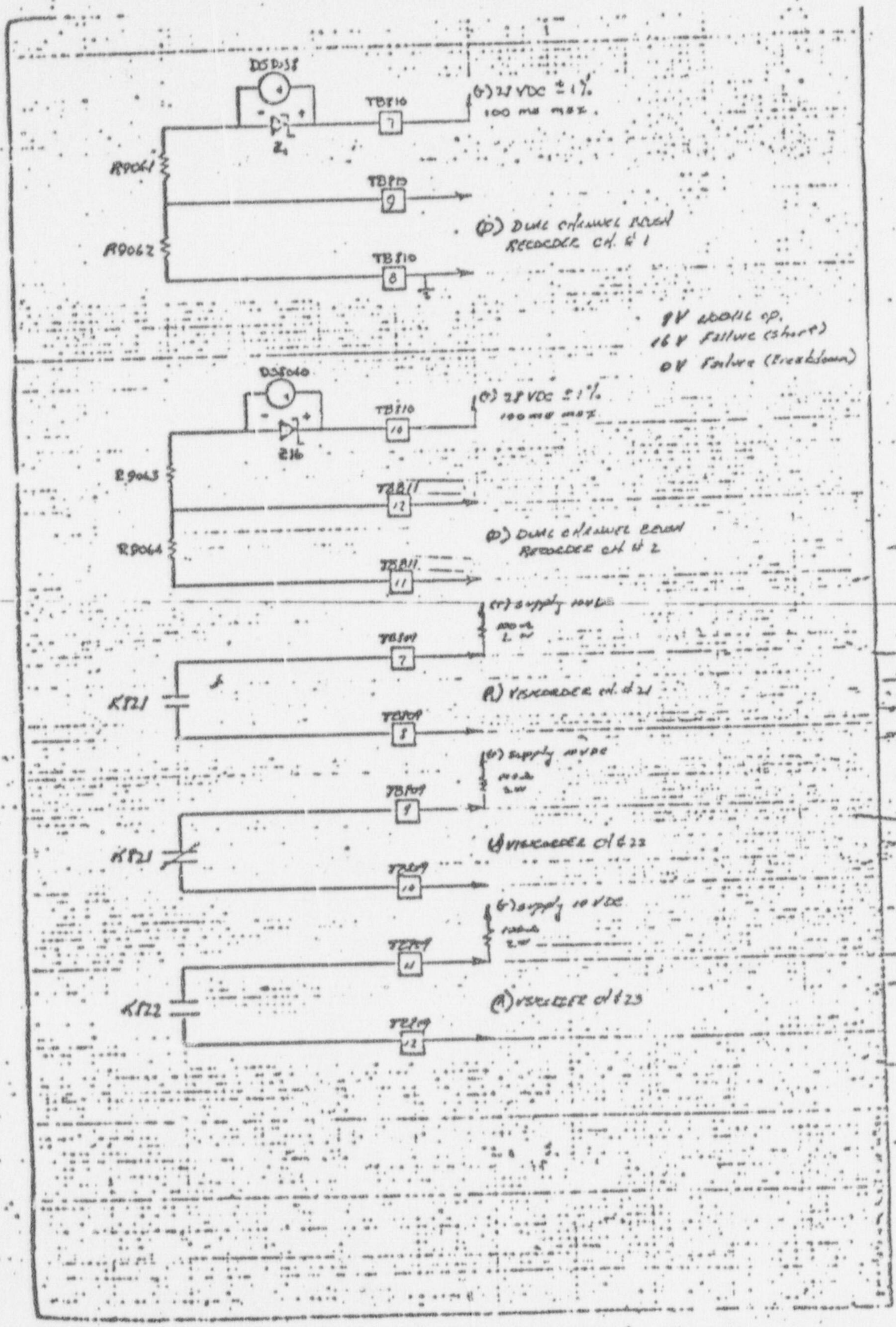


FIGURE 4 (cont'd)

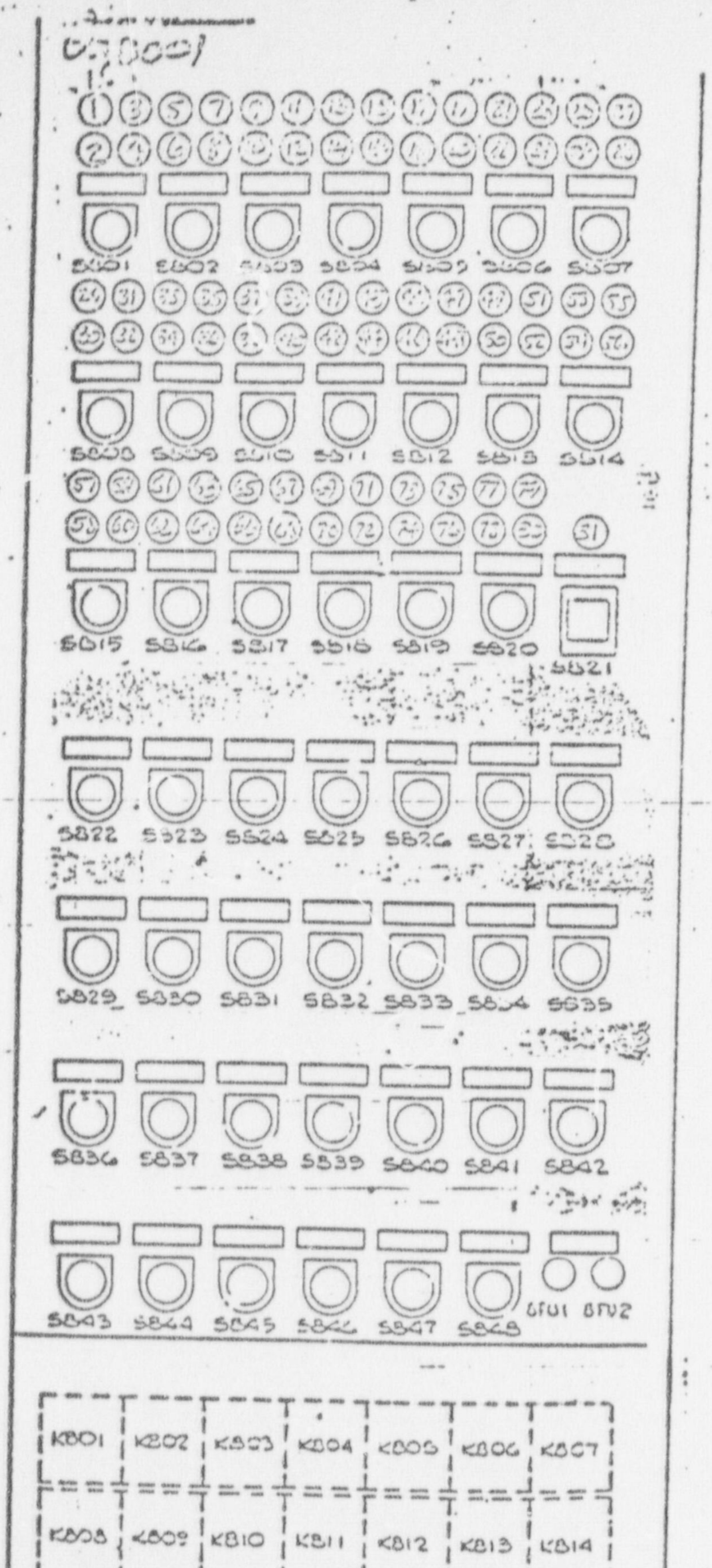
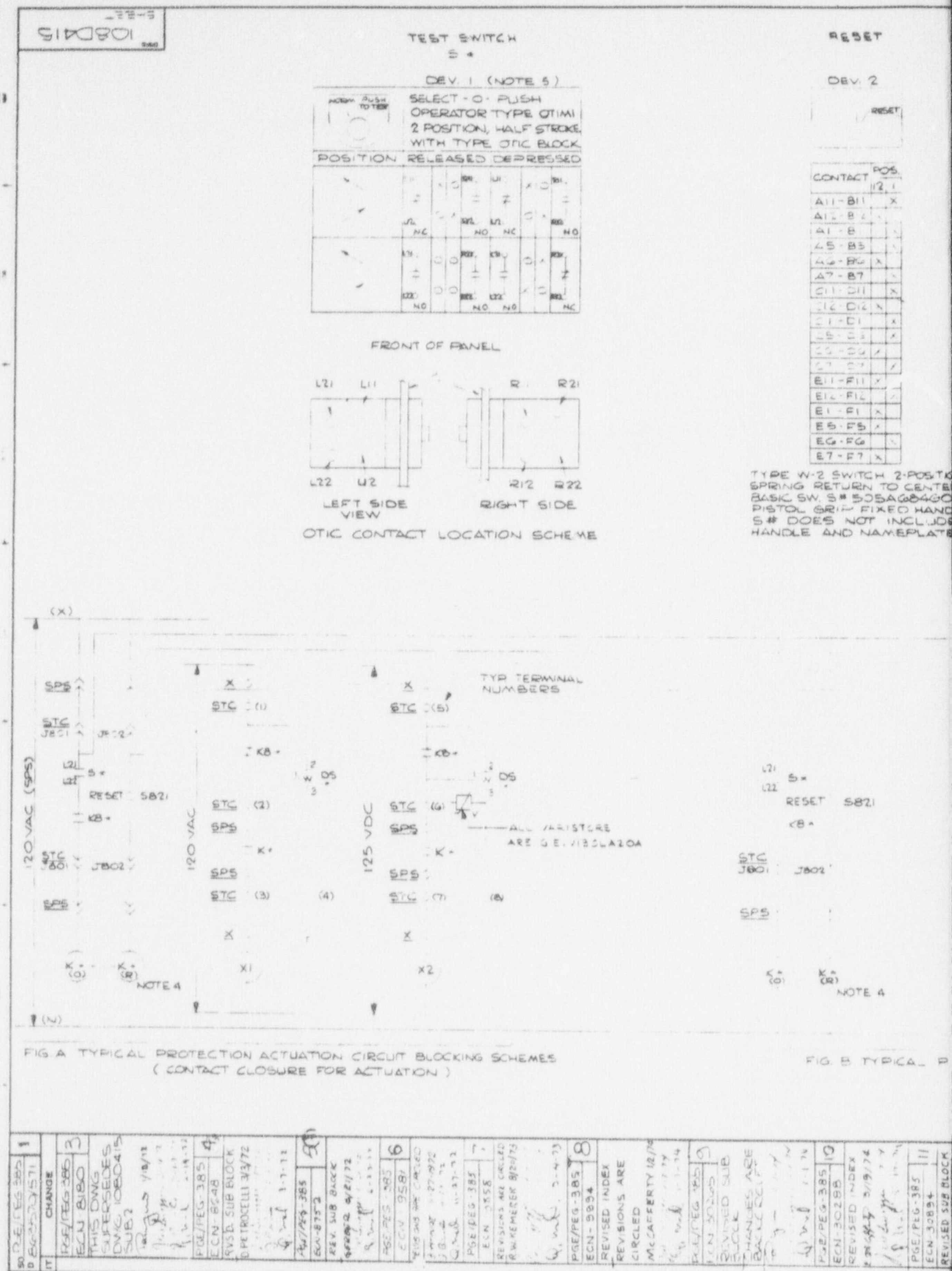


FIGURE 5

SOLID STATE PROTECTION SYSTEM TEST CABINET

COMPONENT LOCATIONS



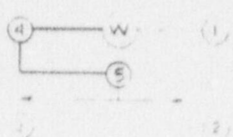
i D

36

i C B i A

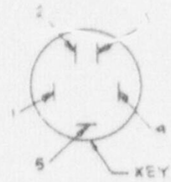
24

TEST LIGHT
DS *
DEV. 3



ILLUMINATED PUSH BUTTON SWITCH WITH 28V LAMP NO. 327 (EXCEPT AS NOTED)

REAR OF PANEL



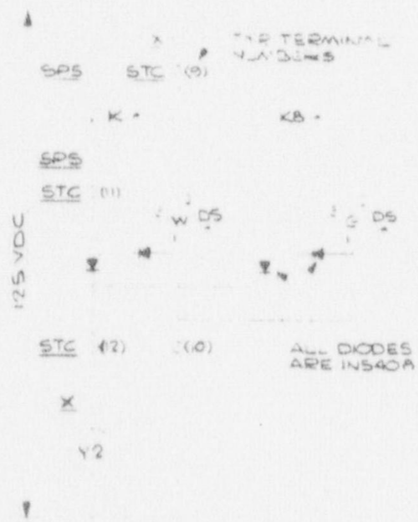
CONTACT LOCATION SCHEME

GENERAL NOTES

1. CIRCUITRY AND HARDWARE FOR REDUNDANT PROTECTION TRAINS "A" AND "B" TEST CABINETS ARE DUPLICATE EXCEPT AS NOTED:
   A - TRAIN "A" ONLY
   B - TRAIN "B" ONLY
2. IN FIGURES A, B, ... THE SYMBOL * REPRESENTS THE SUFFIX NUMBER OF THE DEVICE REFERENCED.
   EXAMPLE:
   K* - SPS RELAY, K601, K602, ETC.
   S* - STC TEST SWITCH, S602, S834, ETC.
   K8* - STC RELAY, K811, K817, ETC.
   DS* - STC LIGHT, DS8009, DS8077, ETC.
3. "FIGURE A" & "B" TYPE CIRCUITS ARE DETAILED ON THE SCHEMATICS. "FIGURE B" CIRCUITS WILL BE SUBSTITUTED FOR FIGURE "A" CIRCUITS WHERE REQUIRED.
4. THE OUTPUT RELAYS IN THE SOLID STATE PROTECTION SYSTEM THAT ARE LATCH TYPE ARE DESIGNATED BY AN IN THE L COLUMN ON SHEET 2.
5. SWITCHES S801 THRU S848 TO BE EQUIPPED WITH SPRING RETURN FROM RIGHT TO LEFT POSITION WHEN DESIGNATED BY AN "X" IN THE SR COLUMN ON SHEET 2.
6. UNUSED CIRCUIT DEVICES AND WIRING WILL NOT BE FURNISHED, AND BLANK PANEL OPENINGS WILL BE CAPPED.
7. MINIMUM TEST CURRENT ON STANDARD FIG. A AND D CIRCUITS IS 25 ma.

LOCATION LEGEND

SPS - SOLID STATE PROTECTION SYSTEM
STC - SAFEGUARDS TEST CABINET
X - SWGR, MCC, AUXILIARY RELAY RACK, ETC.
ASC - AUXILIARY SAFEGUARDS CABINET



...OTECTION ACTUATION CIRCUIT BLOCKING SCHEMES
(CONTACT OPENING FOR ACTUATION)

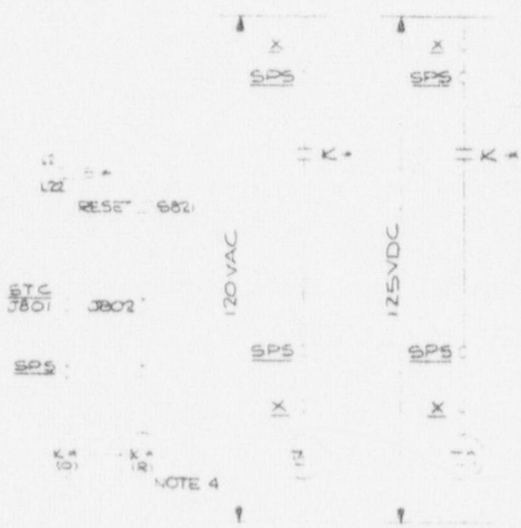


FIG. C TYPICAL PROTECTION ACTUATION CIRCUIT WITHOUT BLOCKING SCHEMES

SHEET	SUB
[illegible]	[illegible]

FOR TYPICAL STEAM DUMP TEST LIGHT CIRCUIT FIG. D SEE SHT. 4.

TYPICAL CIRCUITS, NOTES AND LEGENDS

Westinghouse Electric Corporation
NUCLEAR ENERGY SYSTEMS PITTSBURGH, PA. U.S.A.

TITLE: PACIFIC GAS & ELECTRIC CO.
DIABLO CANYON UNITS 1 & 2
SAFEGUARDS TEST CABINET

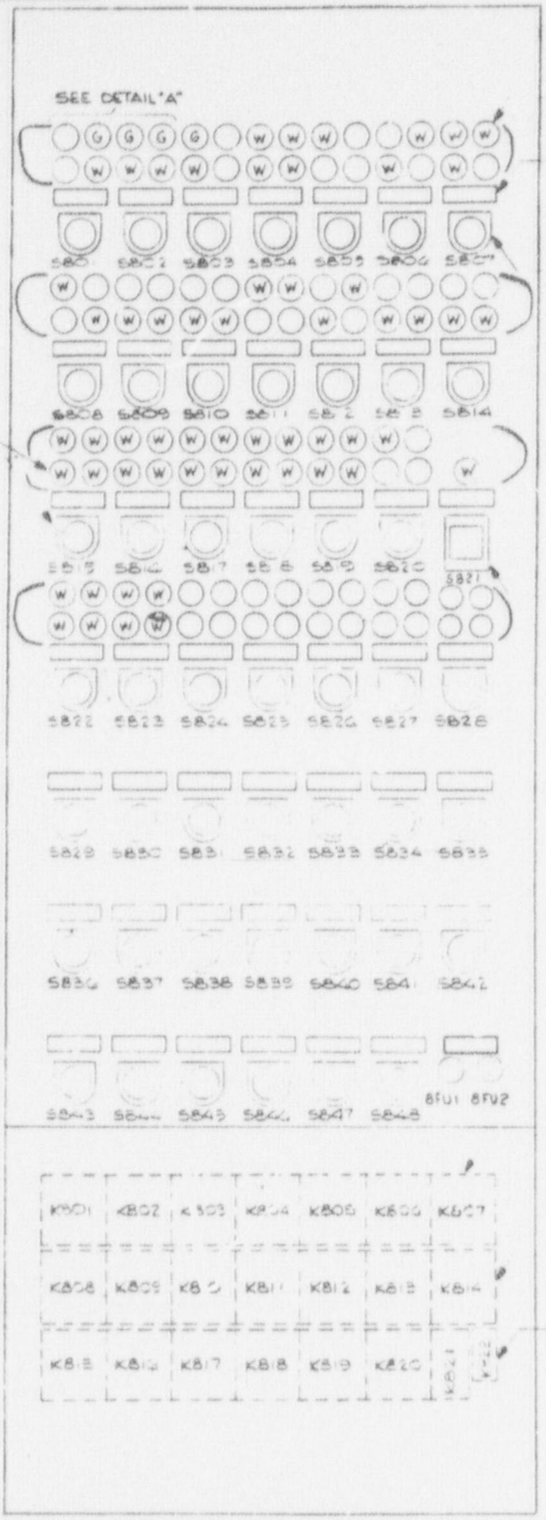
SCALE: NTS
DIMENSIONS IN INCHES
DO NOT SCALE

1080415
SHEET 1
SUB 1 2 3 5 6 7 8 9 10 11

6 5 4 3 2 1

0 A A B C 24 D 36

IC8D415
SHEET 2



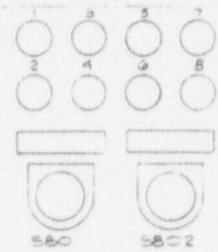
FRONT PANEL

NOTE 6 SH. 1

LIST OF MATERIALS		
ITEM	QTY	DESCRIPTION
1	*	TEST SWITCH, W TYPE OT1 (DEV. 1, SH. 1)(NOTE 5)
2	▲	TEST LIGHT WITH 28V LAMP NO. 327 (DEV. 3 SH. 1)
3	1	RESET SWITCH, W TYPE W2 (DEV. 2, SH. 1)
4	13	RELAY 120VAC POTTER & BRUMFIELD SERIES MDR
5	1	RELAY, 120 VAC, C P CLARE NO GP1RC1A6000
6	■	TAG, FUNCTION

* 31 TRAIN A ▲ 60 TRAIN A ■ 35 TRAIN A
32 TRAIN B 57 TRAIN B 34 TRAIN B

DETAIL "A"



TYPICAL LIGHT NUMBERING

LIGHT NUMBERS REPRESENT LAST NO'S. OF LIGHT DESIGNATION
EXAMPLE: 7 = DS8007

ITEM	FUNCTION
K801	
K802	
K803	
K804	
K805	
K806	
K807	
K808	
K809	
K810	TEST (FUNCTION BLOCKING) RELAYS
K811	
K812	
K813	
K814	
K815	
K816	
K817	
K818	
K819	
K820	
K821	TEST AUXILIARY RELAY
K822	RESET MONITOR RELAY
8FU1	FUSE, 120 VAC SUPPLY
8FU2	FUSE, SPARE

** NOTE: THESE LI

ITEM	S2
SB01	
SB02	
SB03	
SB04	
SB05	
SB06	
SB07	
SB08	
SB09	
SB10	
SB11	
SB12	
SB13	
SB14	
SB15	X
SB16	X
SB17	X
SB18	X
SB19	X
SB20	X
SB21	X
SB22	X
SB23	X
SB24	X
SB25	X
SB26	X
SB27	X
SB28	X

CHANGE	
3	PGE/PEG 385 ECN-8180 THIS DWG SUPERSEDES DWG 108D415 SUB 2
4	PGE/PEG-385 ECN-8648 CHANGES ARE BACKCIRCLED D. PETROCELLI 3/3/72
5	PGE/PEG-385 ECN-8752 REV. CIRCLED 6/29/72
6	PGE/PEG 385 ECN-9858 CHANGES ARE BACKCIRCLED R.W. KEMERER

11 10 9 8 7

36 D 24 C B

[illegible]	L	FUNCTION	DEVICE	LIGHT	DEVICE	LIGHT
01	L	FEEDWATER ISOLATION		[illegible] [illegible]	LOOP FEEDWATER CONTROL VLV FCV-510	DS8003 DS8004
20		FEEDWATER ISOLATION	LOOP 2 FEEDWATER CONTROL VLV FCV-520	DS8005 DS8006	LOOP 3 FEEDWATER CONTROL VLV FCV-530	DS8007 DS8008
36	L	FEEDWATER ISOLATION	LOOP 4 FEEDWATER CONTROL VLV FCV-540	DS8009 DS8010		[illegible] [illegible]
21		TURBINE AND FEEDWATER PUMP TRIPPING	[A] FCV-438, [B] F.W. PP 1 TRIP	DS8013	[A] FCV-440 [illegible] F.W. PP 2 TRIP	DS8015
		[A] TURBINE AND FEEDWATER PUMP TRIPPING	[A] FCV-439 [B] TURB TRIP VIA 20/ET [A] TURB TRIP VIA 20/AST	DS8014 DS8017	[A] FCV-441 [B] TURB TRIP VIA 20/ASC	DS8016 [illegible]
		[B] CONTAINMENT ISOLATION PHASE "B"		[illegible] [illegible]	[A] FCV-355	[illegible] DS8023
19	L	CONTAINMENT ISOLATION PHASE "B"	[A] FCV-356 [B] FCV-363 [A] FCV-749	DS8022 DS8025 DS8026	[A] FCV-750 [B] FCV-357	[illegible] DS8027 [illegible]
11	L	SAFETY INJECTION	[A] BUS F XFER [B] BUS G XFER	DS8029		[illegible]
27		REACTOR COOLANT PUMP UNDERFREQ. TRIP		[illegible] [illegible]	BUS H XFER	DS8032 [illegible]
28		REACTOR COOLANT PUMP UNDERFREQ. TRIP	REAC. COOL PP 12 TRIP	DS8034 [illegible]	REAC COOL PP14 TRIP	DS8036 [illegible]
35		GENERATOR TRIP AND STEAM DUMP INTERLOCK	REAC COOL PP11 TRIP STEAM DUMP CKT	DS8038 DS8041	REAC COOL PP13 TRIP GENERATOR TRIP	DS8040 DS8043
07	L	CONTAINMENT ISOLATION PHASE 'A'		[illegible] [illegible]	[A] VALVE 8112	[illegible] DS8047
16		STEAM LINE ISOLATION	[B] VALVE 8100	DS8046 [illegible]		[illegible] [illegible]
23		STEAM LINE ISOLATION	LP1 STM LINE STP VLV FCV-41	DS8050 [illegible]	LP2 STM LINE STP VLV FCV-42	DS8052 [illegible]
			LP3 STM LINE STP VLV FCV-43	DS8054	LP4 STM LINE STP VLV FCV-44	DS8056
02	L	SAFETY INJECTION	** COOLDOWN COND DUMP VLV PCV-1 ** PCV-3	DS8057 DS8058	** COOLDOWN COND DUMP VLV PCV-6 ** PCV-8	DS8059 DS8060
03	L	SAFETY INJECTION	** COND DUMP VLV PCV-2 ** PCV-4	DS8061 DS8062	** COND DUMP VLV PCV-5 ** PCV-7	DS8063 DS8064
04	L	SAFETY INJECTION	** PCV-9 ** PCV-10	DS8065 DS8066	** PCV-11 ** PCV-12	DS8067 DS8068
05	L	CONTAINMENT ISOLATION, PHASE 'A'	** ATM DUMP VLV PCV-47 ** PCV-50	DS8069 DS8070	** ATM DUMP VLV PCV-51 ** PCV-52	DS8071 DS8072
06	L	CONTAINMENT ISOLATION, PHASE 'B'	** PCV-53 ** PCV-54	DS8073 DS8074	** PCV-65 ** PCV-66	DS8075 DS8076
08	L	SAFETY INJECTION	** PCV-67	DS8077 [illegible]		[illegible] [illegible]
		TEST RESET SWITCH	TEST LIGHT	DS8081		
09	L	SAFETY INJECTION	** ATM RELIEF VLV PCV-19 ** PCV-18	DS8082 DS8083	** ATM RELIEF VLV PCV-20 ** PCV-23	DS8084 DS8085
10	L	SAFETY INJECTION	** PCV-24 ** PCV-21	DS8086 DS8087	** PCV-25 ** PCV-22	DS8088 DS8089
17	L	CONTAINMENT ISOLATION PHASE A [B]		DS8090 DS8091		DS8092 DS8093
13	L	CONTAINMENT ISOLATION, PHASE 'A'		DS8094 DS8095		DS8096 DS8097
14	L	CONTAINMENT ISOLATION, PHASE 'A'		DS8098 DS8099		DS8100 DS8101
[illegible]	L	CONTAINMENT VENT ISOLATION		DS8102 DS8103		DS8104 DS8105
[illegible]	L	CONTAINMENT ISOLATION, PHASE 'B'		DS8106 DS8107		DS8108 DS8109
[illegible]	L	CONTAINMENT VENT ISOLATION				
[illegible]	L	CONTAINMENT ISOLATION PHASE 'B'				
[illegible]	L	[illegible]				
[illegible]	L	STEAM LINE ISOLATION				
[illegible]	L	AUXILIARY FEEDWATER PUMP START				
[illegible]	L	AUXILIARY FEEDWATER PUMP START				
[illegible]	L	AUXILIARY FEEDWATER PUMP START				
[illegible]	L	CONTAINMENT SPRAY ACTUATION				
[illegible]	L	CONTAINMENT SPRAY ACTUATION				
[illegible]	L	CONTAINMENT SPRAY ACTUATION				

[illegible]S ARE TESTED IN CONJUNCTION WITH TEST SWITCH S332.

PANEL ARRANGEMENT

Westinghouse Electric Corporation
NUCLEAR ENERGY SYSTEMS PITTSBURGH PA U.S.A.

TITLE: PACIFIC GAS & ELECTRIC CO. DIABLO CANYON UNITS 1 & 2 SAFEGUARDS TEST CABINET

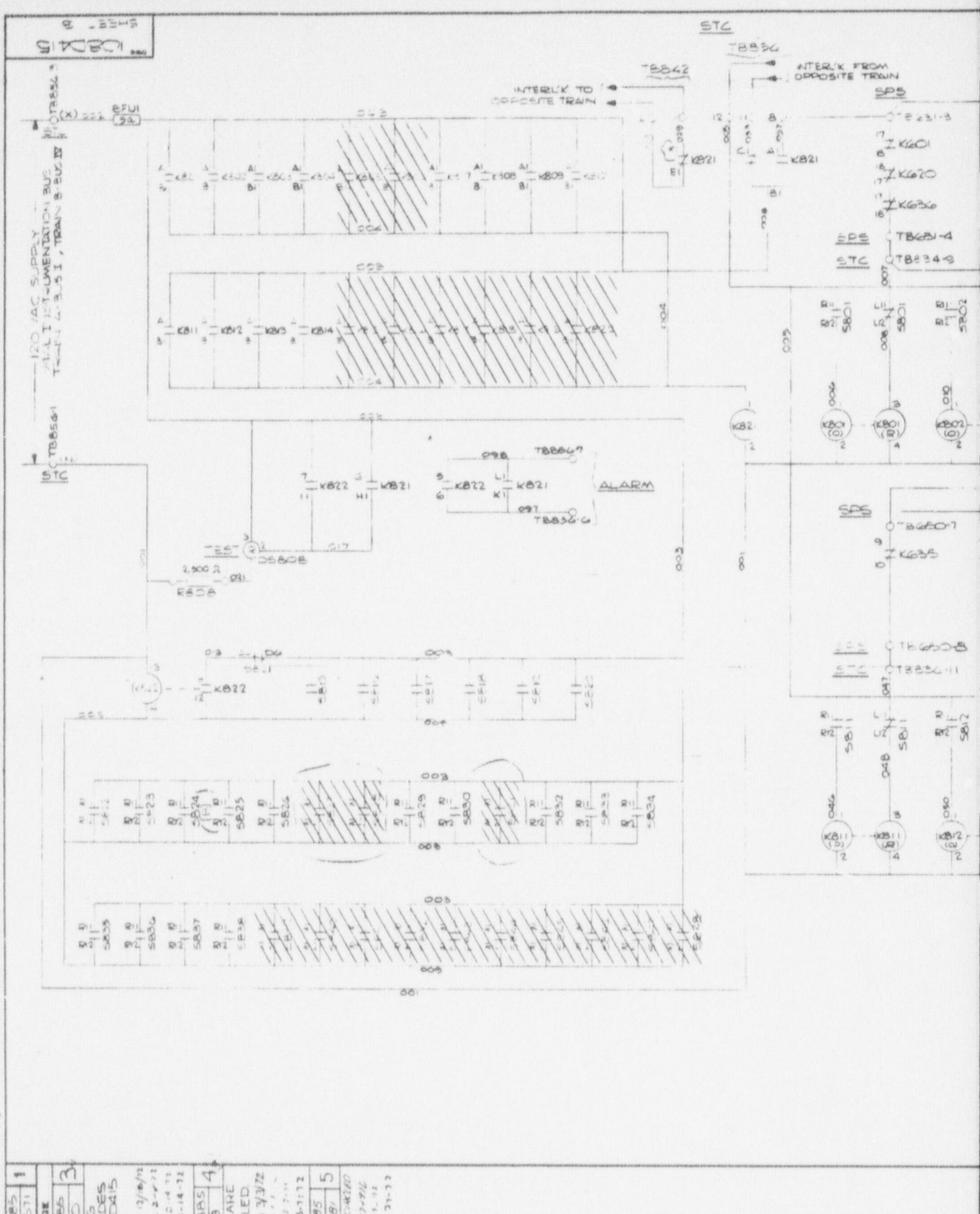
NTS SCALE | DIMENSIONS IN INCHES | DO NOT SCALE

1080415 SHEET 2

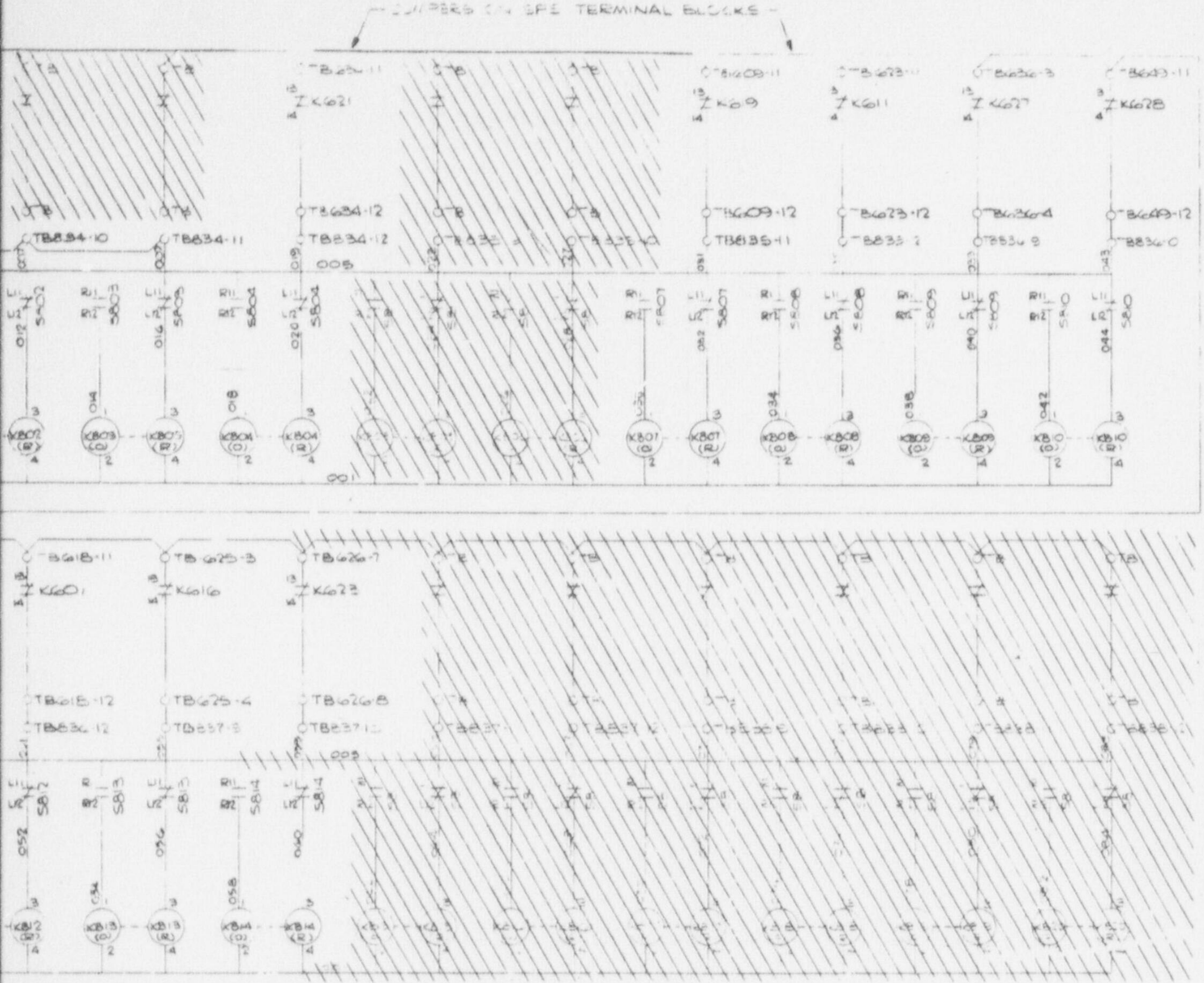
SUB 1 3856

6 | 5 | 4 | 3 | 2 | 1

C 24 D 36


STC
TB836
TB842
INTERL'K FROM OPPOSITE TRAIN
INTERL'K TO OPPOSITE TRAIN
SPS
EFU1
120 VAC SUPPLY
KB21
KB11
KB12
KB13
KB14
KB08
KB09
K601
K620
K636
TB631-4
TB834-9
SB01
SB02
KB01
KB02
ALARM
KB22
TB836-7
TB836-6
DS808
2,500 Ω
RS08
TB650-7
K635
TB650-8
TB836-11
SB11
SB12
KB11
KB12
SB23
SB24
SB25
SB26
SB29
SB30
SB32
SB33
SB34
SB35
SB36
SB37
CHANGE
ECN-8180
THIS DWG SUPERSEDES DWG 1CBD415 SUB 2
ECN-8648
CHANGES ARE BACKCIRCLED.
ECN-9581
REVISION IS CIRCLED
11
10
9
8
7

36 D 24 C B A



TEST RELAY COIL SCHEMATIC

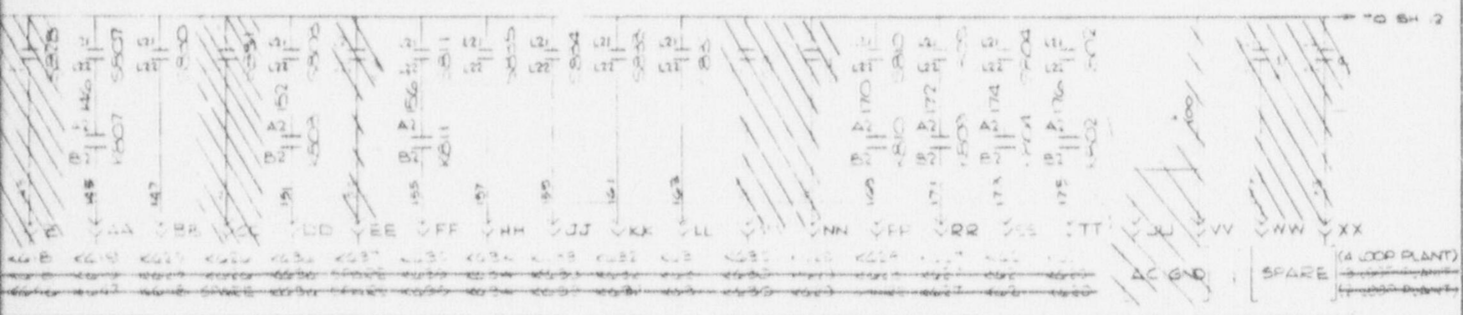
Westinghouse Electric Corporation	
NUCLEAR ENERGY SYSTEMS PITTSBURGH, PA. U.S.A.	
TITLE: PACIFIC GAS & ELECTRIC CO	
DIABLO CANYON UNITS 1 & 2	
SAFEGUARDS TEST CABINET	
NTS SCALE	1C8D415
DIMENSIONS IN INCHES	SHEET 3
DO NOT SCALE	SUB 1

6 5 4 3 2 1

D 36


RESET SB21
TO SOLID STATE PROTECTION SYS - J602
TO SOLID STATE PROTECT
CHANGE
ECN-8180
THIS DWG SUPERSEDES DWG 1080A19 SUB 2
ECN-8648
CHANGES ARE BACKCIRCLED
D PETROCELLI 3/3/72
PGE/PEG-385
ECN 9858
CHANGES ARE BACKCIRCLED
R.W.KEMERER 8/21/73

36 D 24 C B A

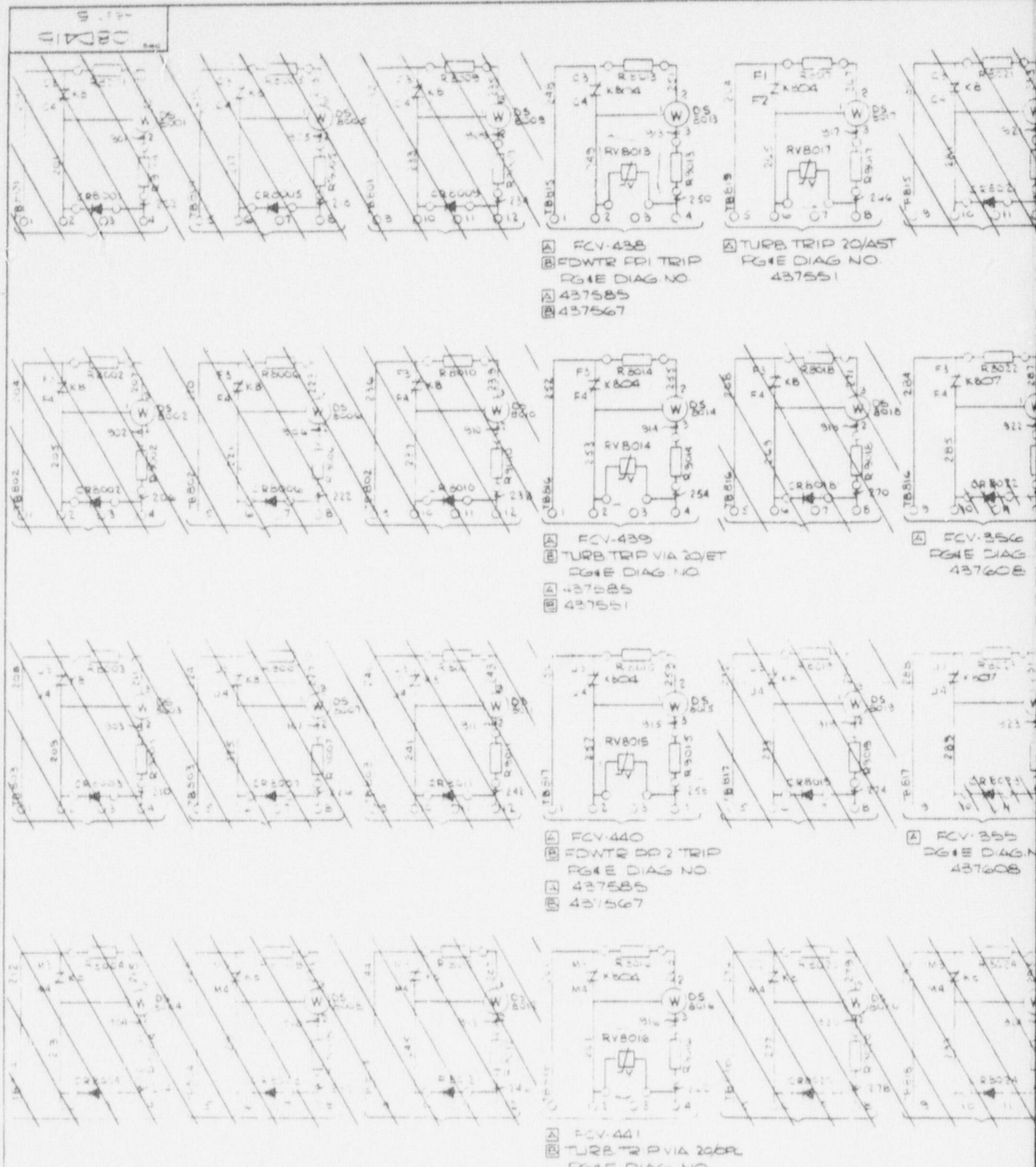


N SYSTEM - J6C1

SPS RELAY ACTUATION

Westinghouse Electric Corporation	
NUCLEAR ENERGY SYSTEMS, PITTSBURGH, PA. U.S.A.	
TITLE: PACIFIC GAS & ELECTRIC CO	
DIABLO CANYON UNITS 1&2	
SAFEGUARDS TEST CABINET	
SCALE NTS	108D415
DIMENSIONS IN INCHES	SHEET 4
DO NOT SCALE	SUB 1895

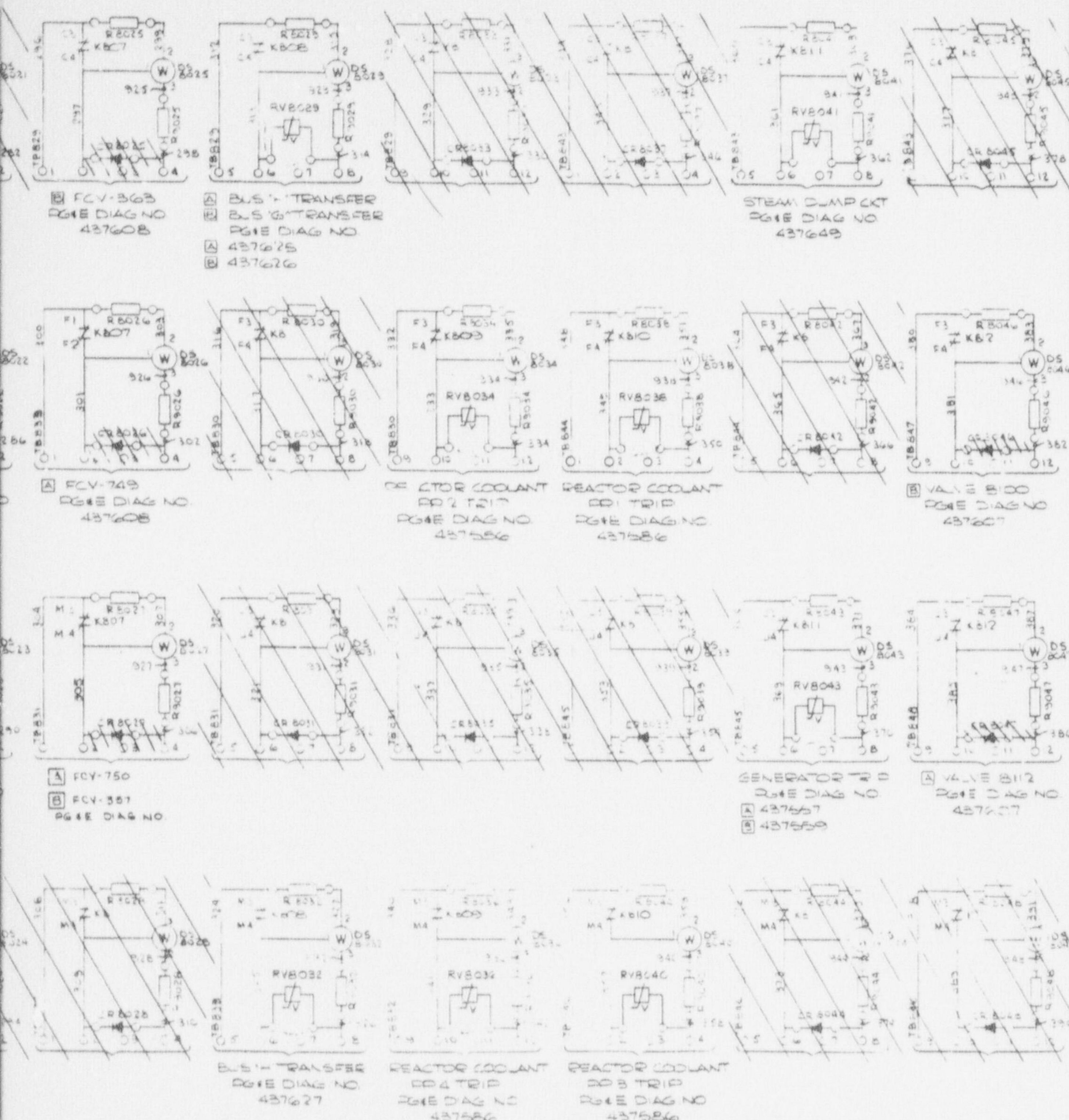
6 5 4 3 2 1



11 10 9 8 7

i D i C B i A A

36 24



...ESS OTHERWISE SPECIFIED.

AC/DC TEST CIRCUIT SCHEMATIC - FIGURE A

Westinghouse Electric Corporation

TITLE PACIFIC GAS & ELECTRIC CO
DIABLO CANYON UNITS 1&2
SAFEGUARDS TEST CABINET

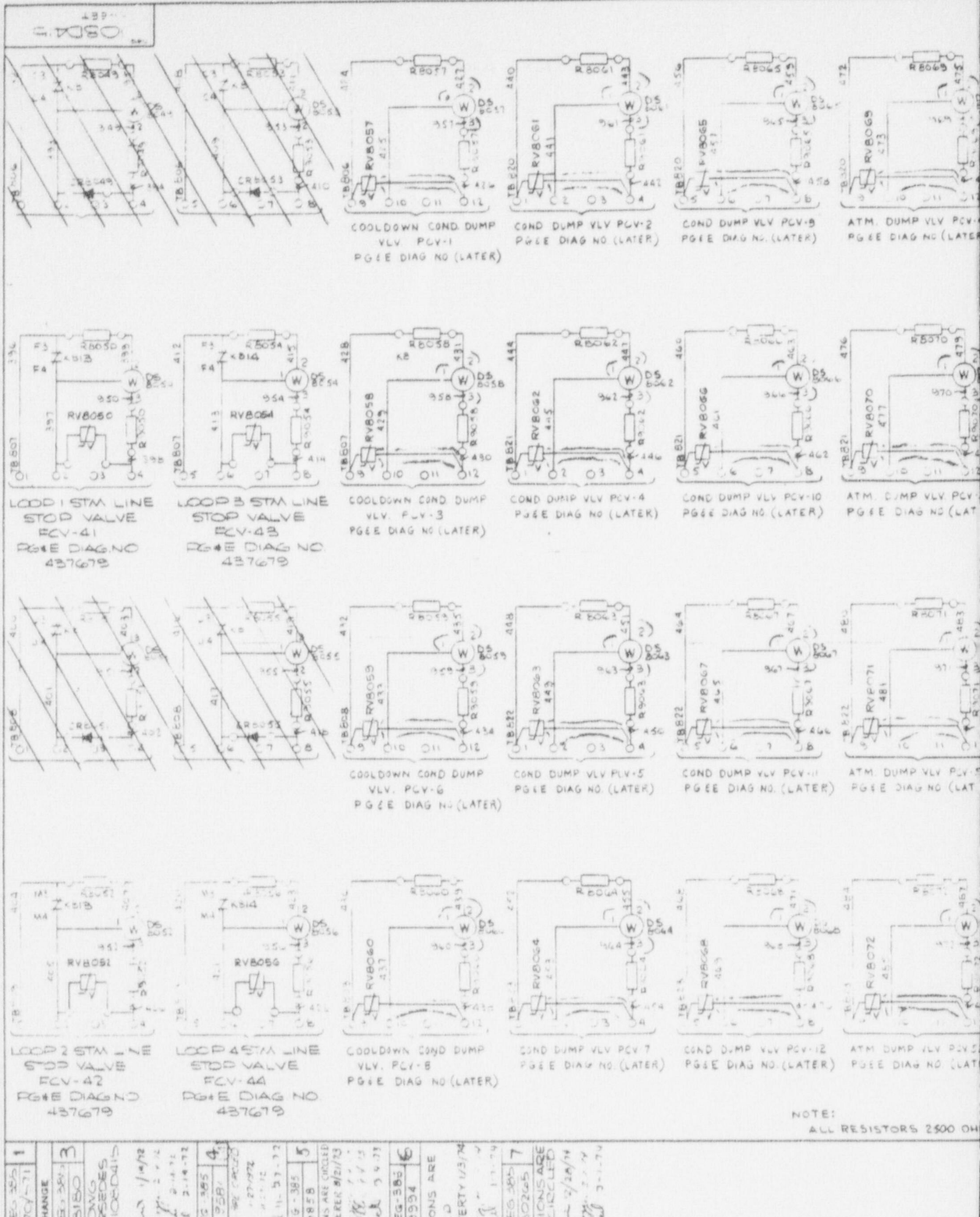
1083415

6 5 4 3 2 1

O A A B C D

24

36



108D415
COOLDOWN COND. DUMP VLV. PCV-1 PG&E DIAG NO (LATER)
COND DUMP VLV PCV-2 PG&E DIAG NO (LATER)
COND DUMP VLV PCV-9 PG&E DIAG NO (LATER)
ATM. DUMP VLV PCV- PG&E DIAG NO (LATER
LOOP 1 STM LINE STOP VALVE FCV-41 PG&E DIAG NO 437679
LOOP 3 STM LINE STOP VALVE FCV-43 PG&E DIAG NO 437679
COOLDOWN COND DUMP VLV. PCV-3 PG&E DIAG NO (LATER)
COND DUMP VLV PCV-4 PG&E DIAG NO (LATER)
COND DUMP VLV PCV-10 PG&E DIAG NO (LATER)
ATM. DUMP VLV PCV- PG&E DIAG NO (LAT
COOLDOWN COND DUMP VLV. PCV-6 PG&E DIAG NO (LATER)
COND DUMP VLV PCV-5 PG&E DIAG NO (LATER)
COND DUMP VLV PCV-11 PG&E DIAG NO (LATER)
ATM. DUMP VLV PCV-5 PG&E DIAG NO (LAT
LOOP 2 STM LINE STOP VALVE FCV-42 PG&E DIAG NO 437679
LOOP 4 STM LINE STOP VALVE FCV-44 PG&E DIAG NO 437679
COOLDOWN COND DUMP VLV. PCV-8 PG&E DIAG NO (LATER)
COND DUMP VLV PCV 7 PG&E DIAG NO (LATER)
COND DUMP VLV PCV-12 PG&E DIAG NO (LATER)
ATM DUMP VLV PCV PG&E DIAG NO (LAT
NOTE: ALL RESISTORS 2500 OH
CHANGE
ECN-8180 THIS DWG SUPERSEDES DWG 108D415 SUB 2
PGE/PEG-385 ECN-9581
PGE/PEG-385 ECN 9858 REVISIONS ARE CIRCLED R.W. KEMERER 8/21/73
PGE/PEG-386 ECN-9954 REVISIONS ARE CIRCLED McCAFFERTY 1/3/74
PGE/PEG-385 ECN-30265 REVISIONS ARE BACKCIRCLED
11
10
9
8
7

36 D C B A 24

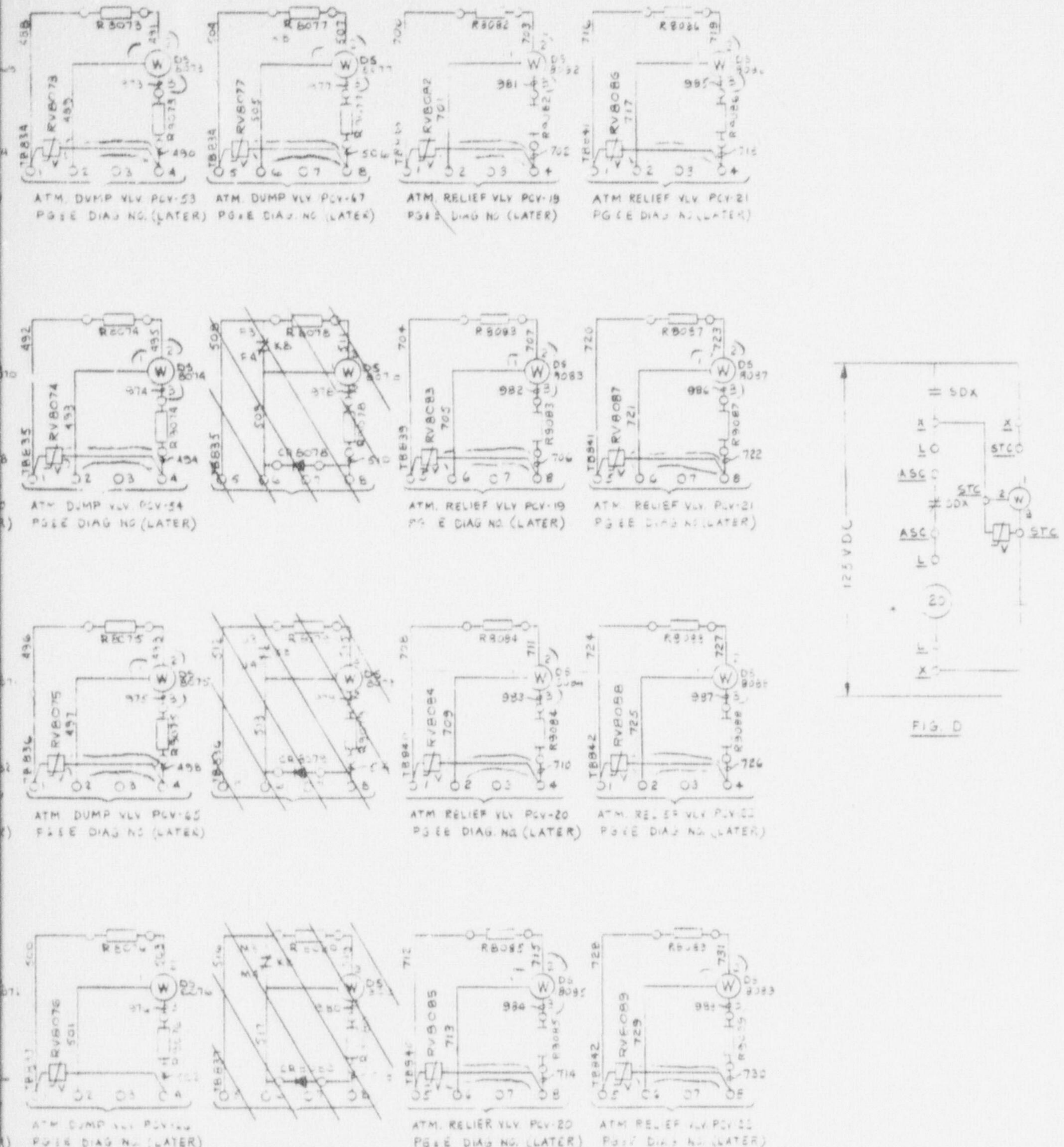


FIG. D

...S UNLESS OTHERWISE SPECIFIED.

AC/DC TEST CIRCUIT SCHEMATIC - FIGURES A & D

Westinghouse Electric Corporation

PACIFIC GAS & ELECTRIC CO.
DIABLO CANYON UNITS 1 & 2
SAFEGUARDS TEST CABINET

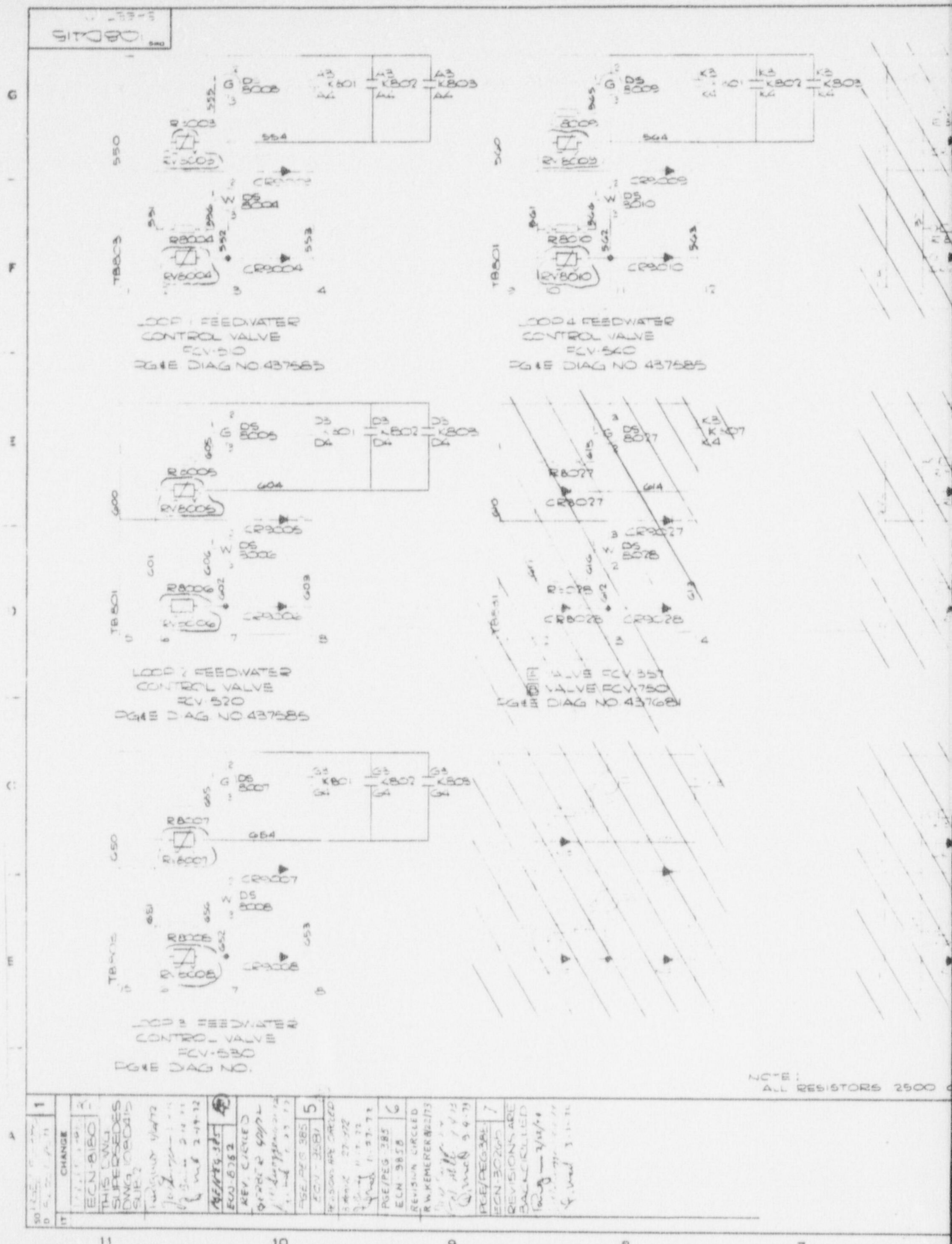
SCALE NTS 108D415

SHEET 6

6 5 4 3 2 1

24

36



i D i C B i A

A

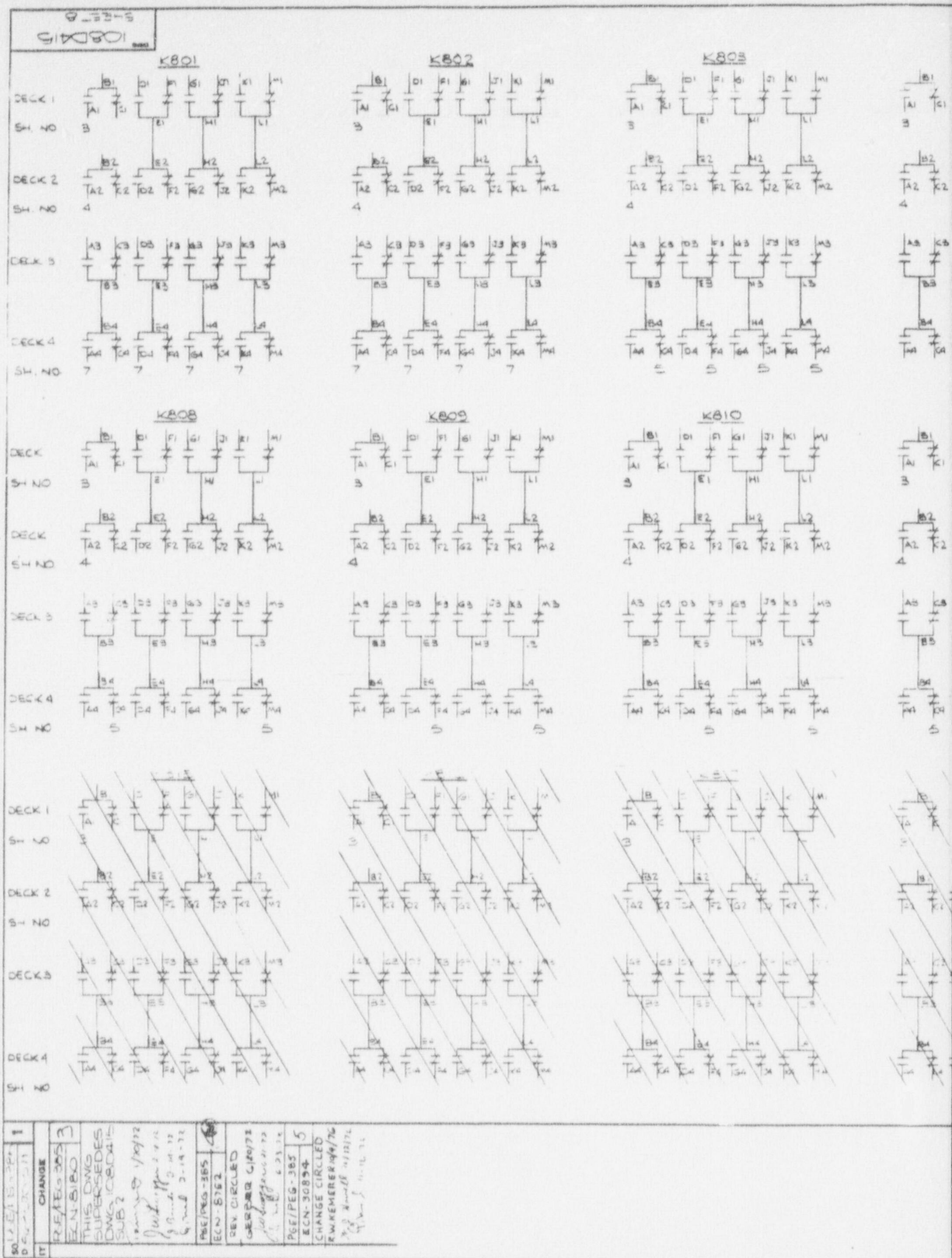
36 24

...HMS UNLESS OTHERWISE SPECIFIED.

DC TEST CIRCUIT SCHEMATICS - FIGURE B

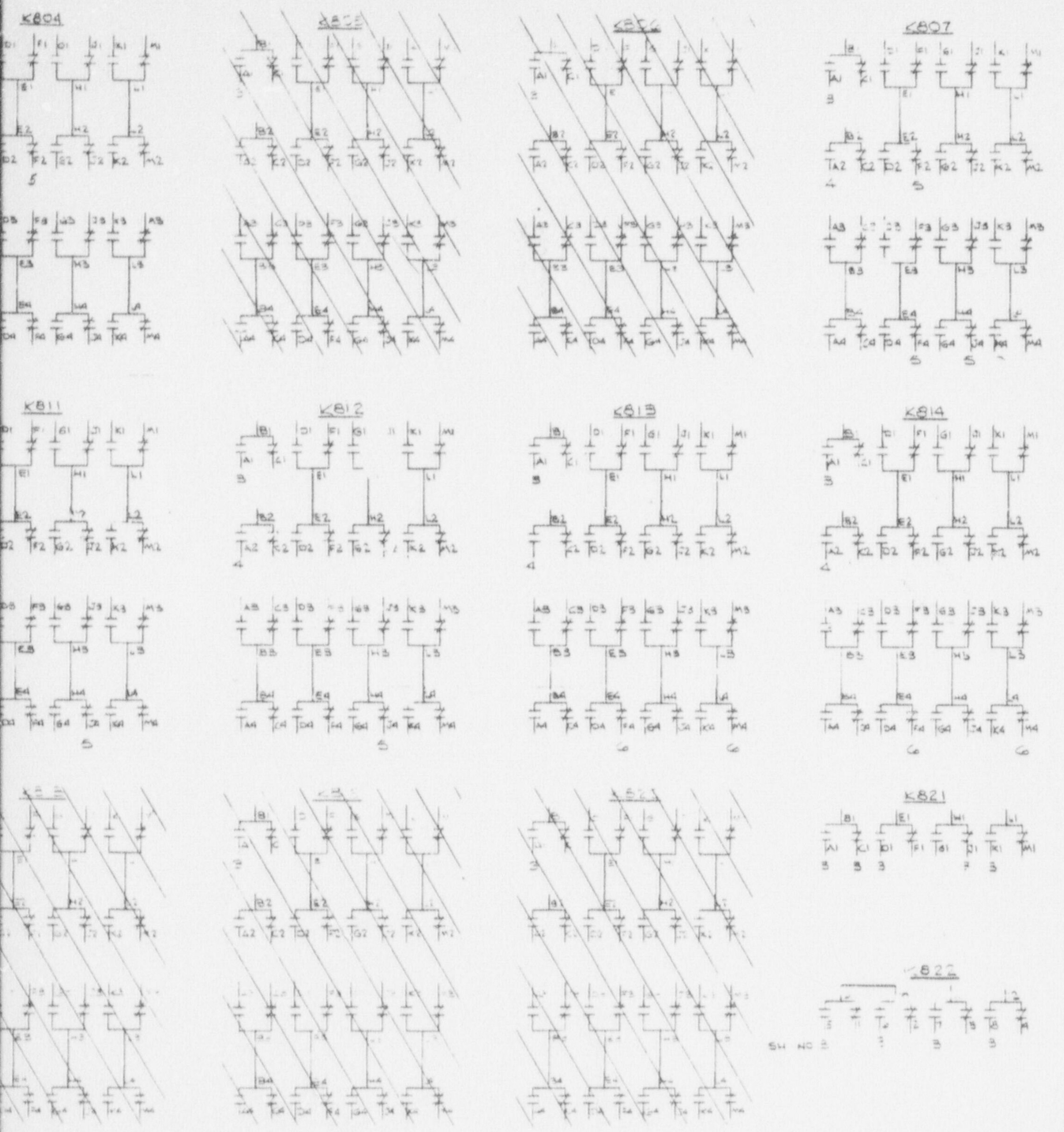
Westinghouse Electric Corporation	
TITLE PACIFIC GAS & ELECTRIC CO. DIABLO CANYON UNITS 1&2 SAFEGUARDS TEST CABINET	
NTS SCALE	1082415
DIMENSIONS IN INCHES	SHEET 7
DO NOT SCALE	

6 5 4 3 2 1



i D i C B i A

36 24



TEST RELAY CONNECTION DIAG - TRAIN-A

Westinghouse Electric Corporation
NUCLEAR ENERGY SYSTEMS PITTSBURGH, PA. U.S.A.

TITLE: PACIFIC GAS & ELECTRIC CO
DIABLO CANYON UNITS 1 & 2
SAFEGUARDS TEST CABINET

DFTM.	
CHKD.	
DES. ENG.	
MFG. ENG.	
MTLS. ENG.	
APP.	
APP.	
APP.	
GRTD. SUPV.	
SCALE: NTS	[illegible]
DIMENSIONS IN INCHES	SHEET 6
DO NOT SCALE	SUB 1

6 5 4 3 2 1

A B C D

24

36


108D415
SHEET 9
K801
K802
K803
K808
K809
K810
DECK 1
SH. NO
DECK 2
DECK 3
DECK 4
CHANGE
THIS DWG SUPERSEDES DWG 108D415 SUB 2
ECN-8180
ECN-8752
REV. CIRCLED
PSE/PEG-385
ECN-30894
CHANGE CIRCLED
11
10
9
8
7

D C B A

36 24

TEST RELAY CONNECTION DIAG - TRAIN B

Westinghouse Electric Corporation
NUCLEAR ENERGY SYSTEMS PITTSBURGH, PA. U.S.A.

TITLE: PACIFIC GAS & ELECTRIC CO
DIABLO CANYON UNITS 1 & 2
SAFEGUARDS TEST CABINET

SCALE NTS
DIMENSIONS IN INCHES
DO NOT SCALE

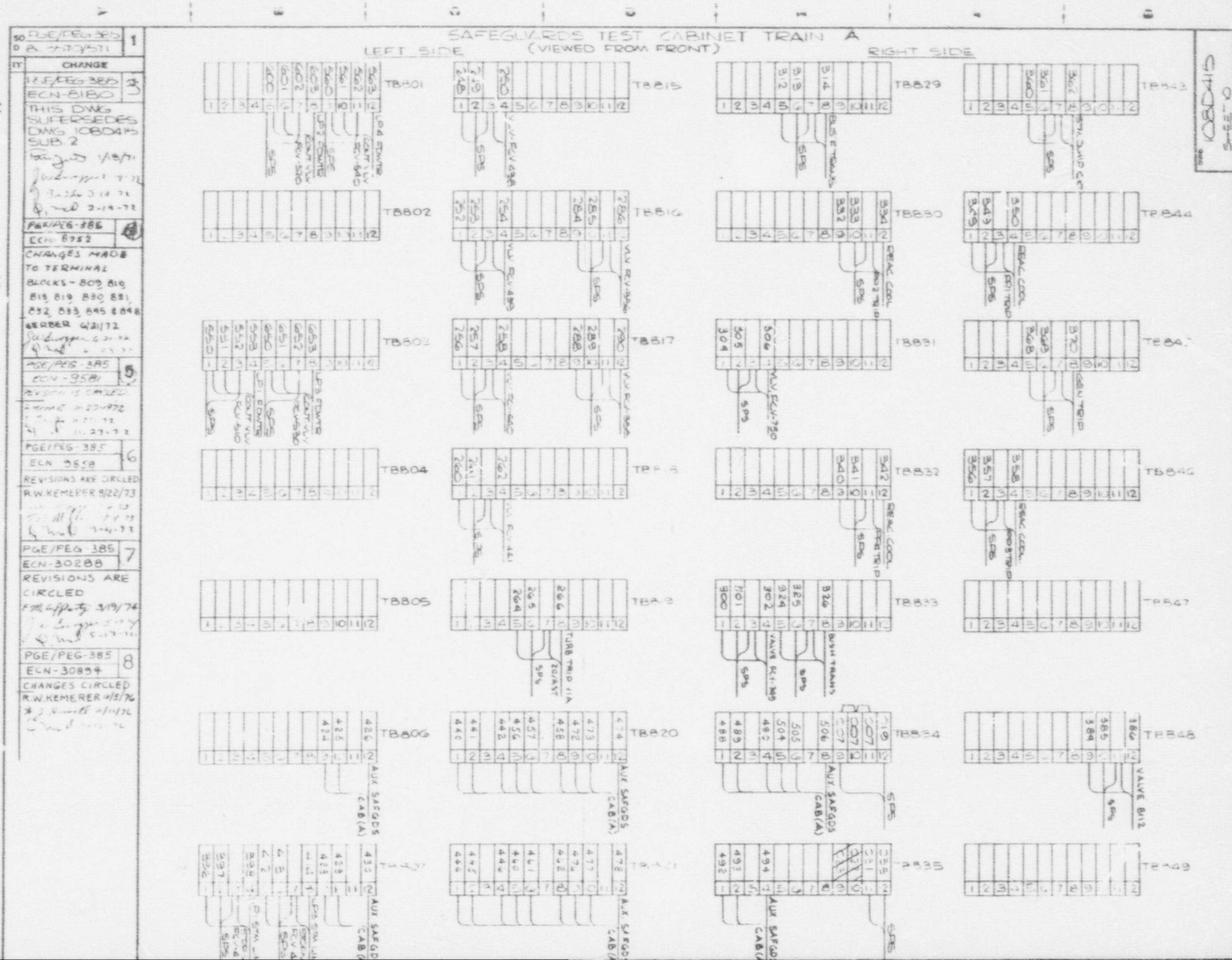
108D415
SHEET 9

6 5 4 3 2 1

0 A A B C D

24

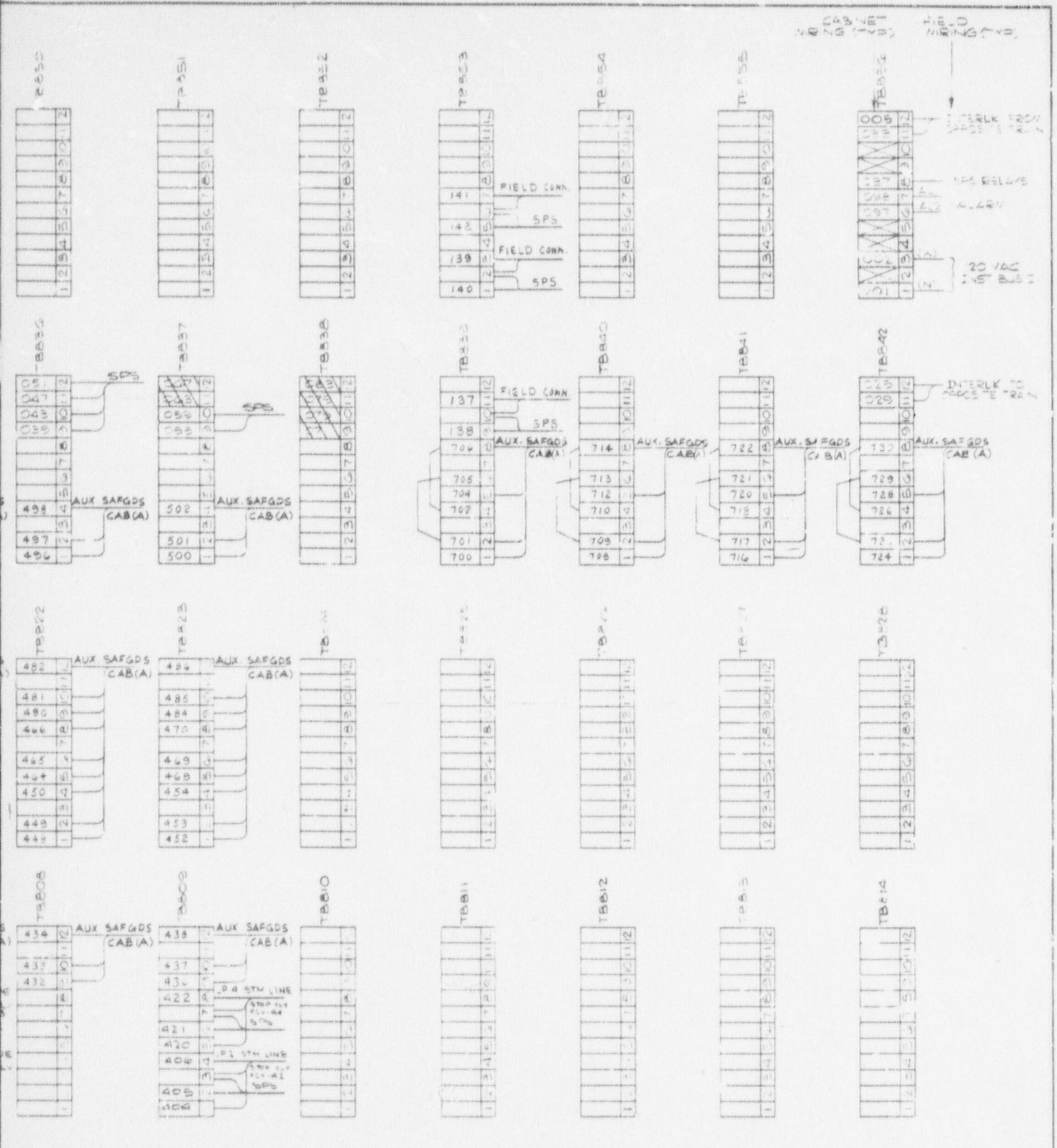
36



11 10 9 8 7

D C B A

36 24



TERMINAL BLOCK CONNECTION DIAG - TRAIN A

Westinghouse Electric Corporation
NUCLEAR ENERGY SYSTEMS, PITTSBURGH, PA. U.S.A.

TITLE: PACIFIC GAS & ELECTRIC CO.
DIABLO CANYON UNITS 1 & 2
SAFEGUARDS TEST CABINET

NTS
SCALE
DIMENSIONS IN INCHES
DO NOT SCALE
ICSD4'S
SHEET 10
SUB 1X96678

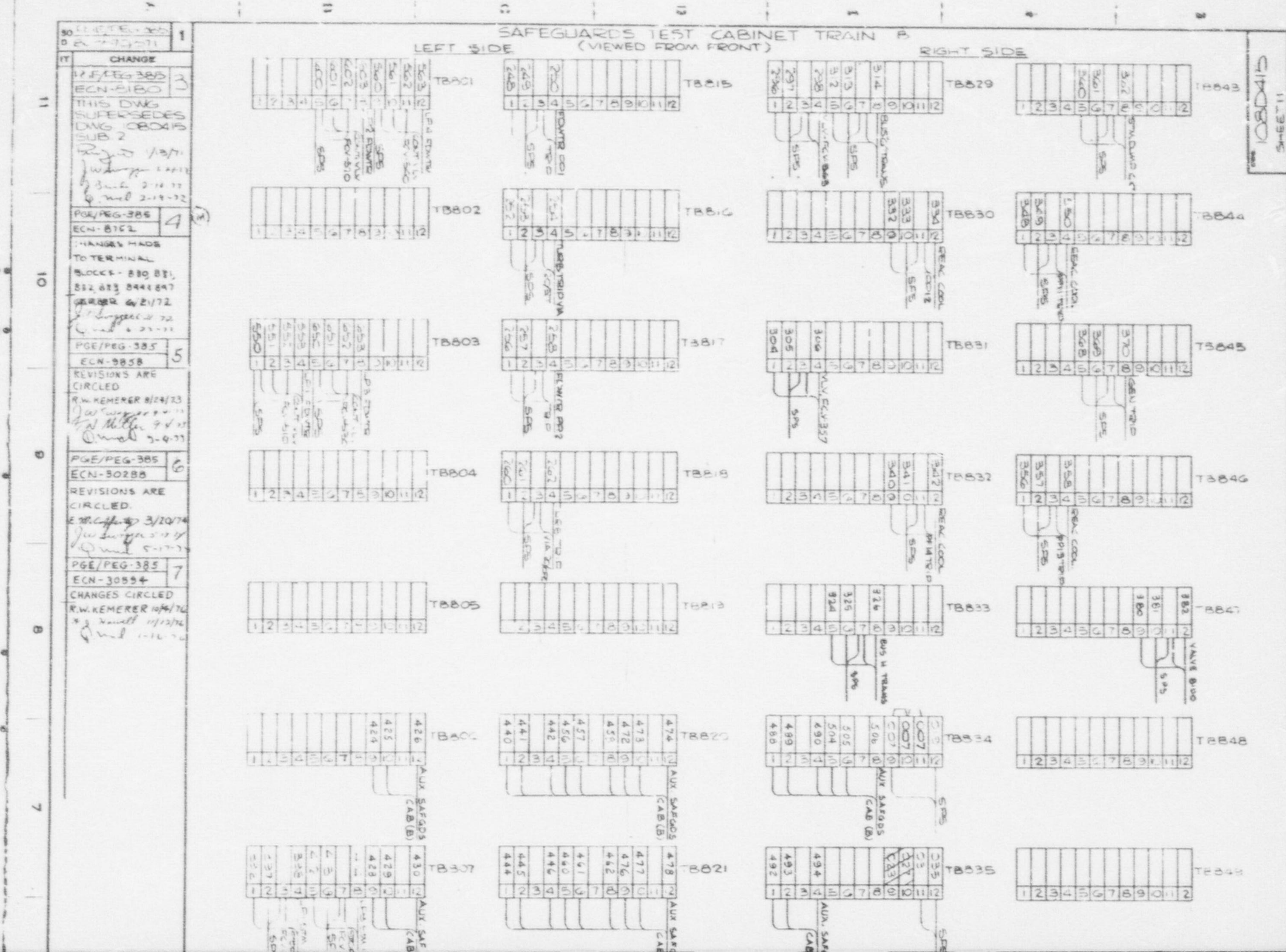
DFTR. | CHKD. | DES. ENG. | MFG. ENG. | MT'LS. ENG. | APP. | APP. | APP. | DPTG. SUPV.

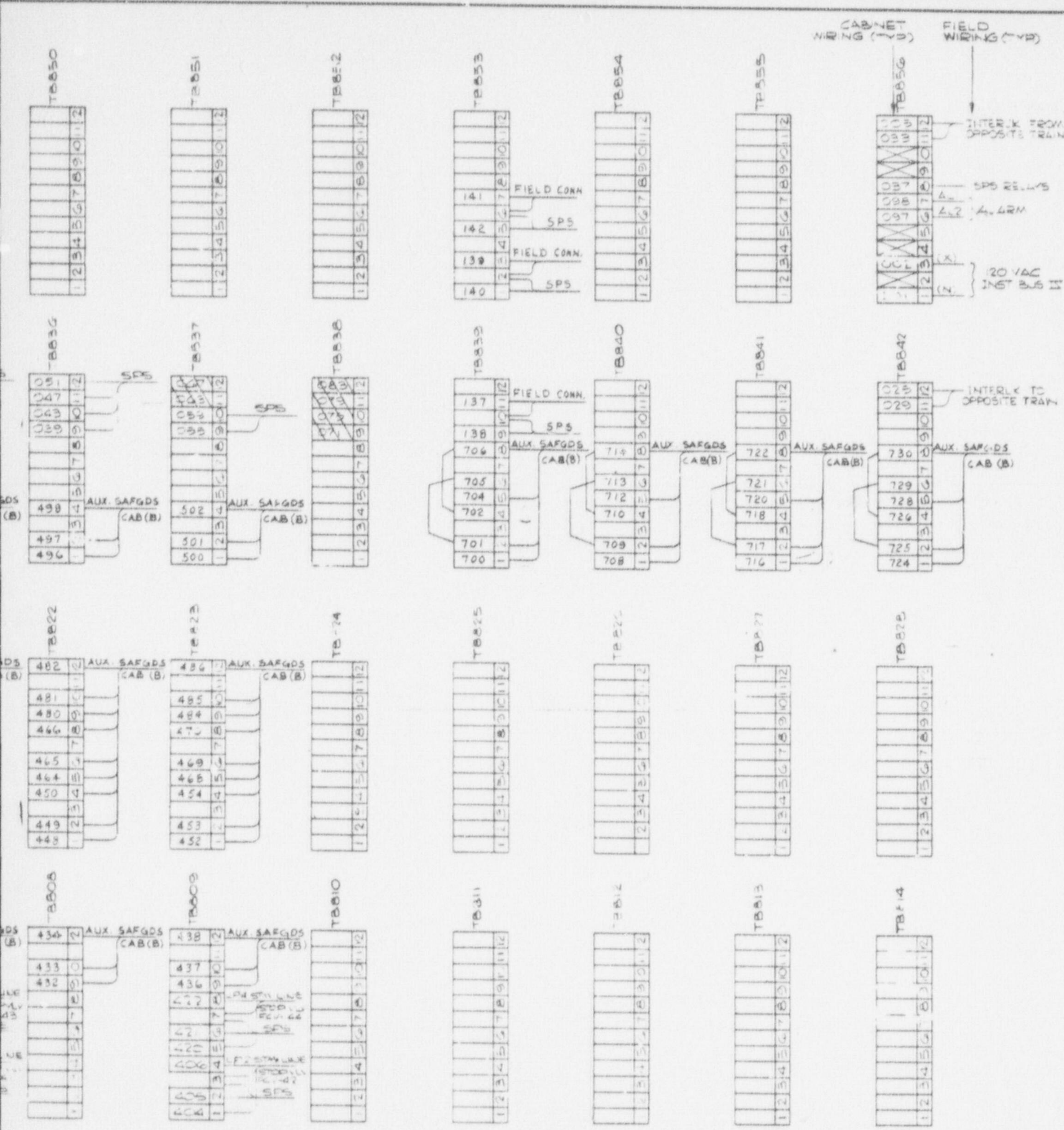
6 5 4 3 2 1

O A A B C D

24

36


SAFEGUARDS TEST CABINET TRAIN B
(VIEWED FROM FRONT)
LEFT SIDE
RIGHT SIDE
TB801
TB802
TB803
TB804
TB805
TB815
TB816
TB817
TB818
TB820
TB821
TB829
TB830
TB831
TB832
TB833
TB834
TB835
TB843
TB844
TB845
TB846
TB848
SPS
AUX SAFGDS CAB (B)
GEN TRIP
BUS H TRANS
VALVE 8100
VLV. FCV-357
CHANGE
PGE/PEG-385 ECN-8180 THIS DWG SUPERSEDES DWG 1080415 SUB. 2
PGE/PEG-385 ECN-8162 CHANGES MADE TO TERMINAL BLOCKS - 830, 831, 832, 833, 844 & 847
PGE/PEG-385 ECN-9858 REVISIONS ARE CIRCLED R.W. KEMERER 8/24/73
PGE/PEG-385 ECN-30288 REVISIONS ARE CIRCLED.
PGE/PEG-385 ECN-30594 CHANGES CIRCLED R.W. KEMERER 10/4/76
1080415
36
24



TERMINAL BLOCK CONNECTION DIAG. - TRAIN B

Westinghouse Electric Corporation

NUCLEAR ENERGY SYSTEMS PITTSBURGH, PA. U.S.A.

TITLE: PACIFIC GAS + ELECTRIC CO.
DIABLO CANYON UNITS 1 & 2
SAFEGUARDS TEST CABINET

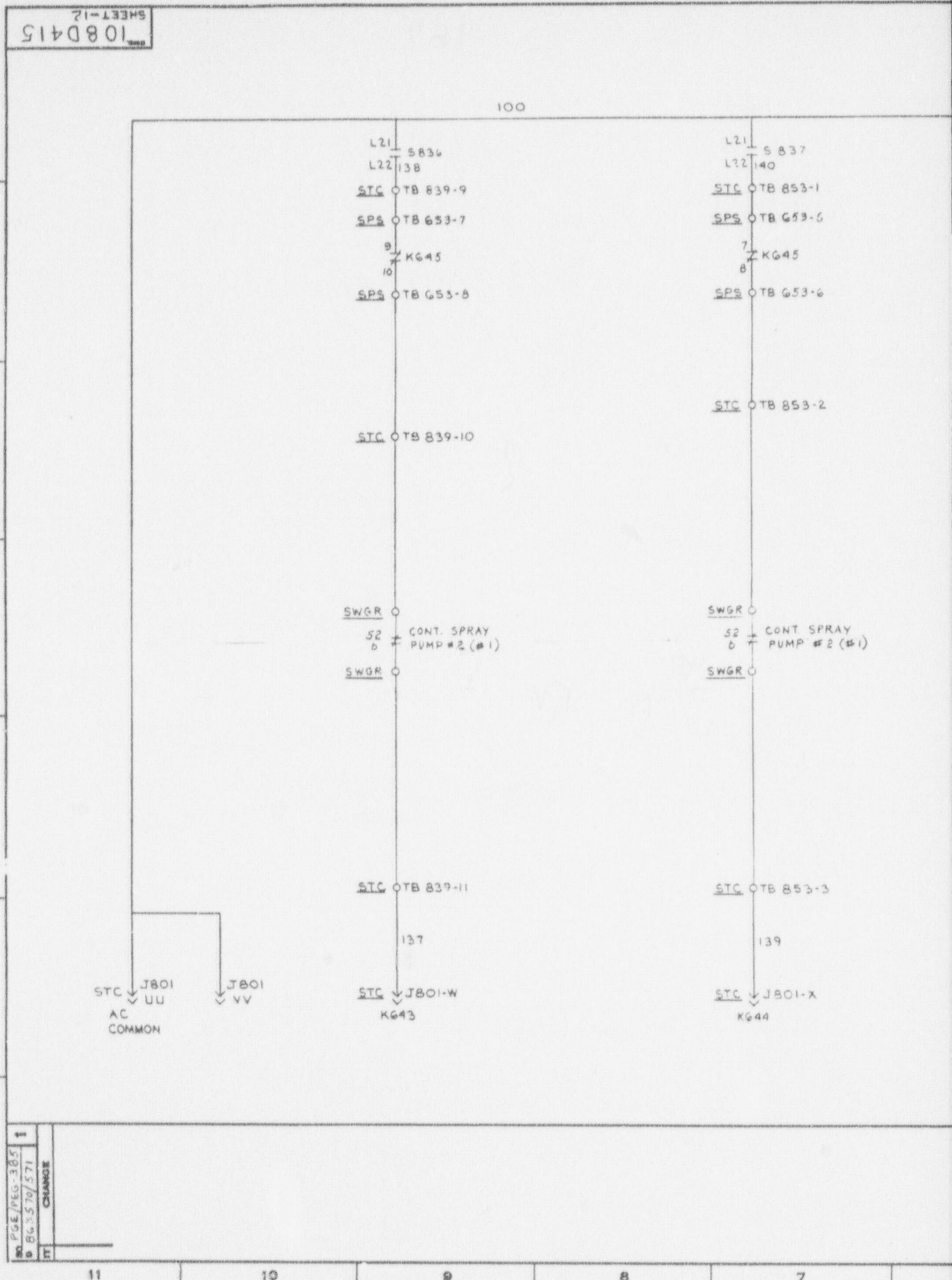
NTS
SCALE
DIMENSIONS IN INCHES
DO NOT SCALE

108D415
SHEET 11

6 5 4 3 2 1

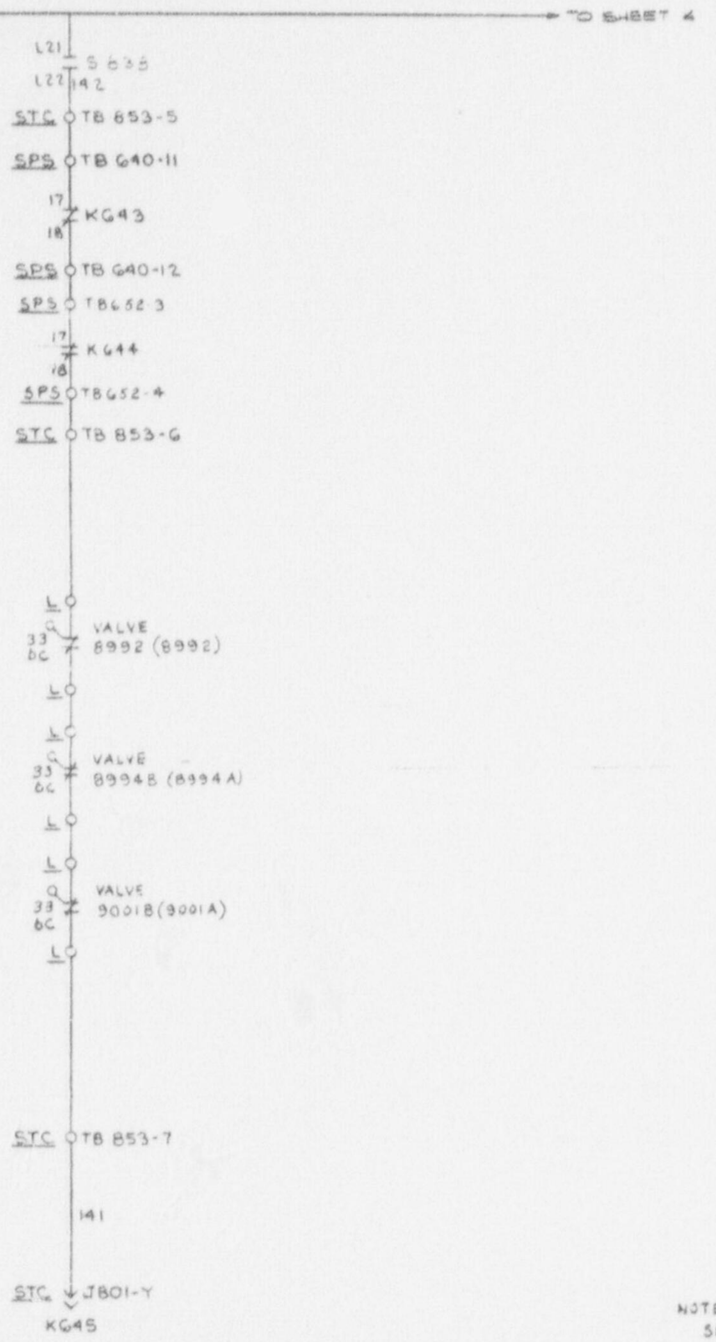
O A B C D

24 36



108D415
SHEET-12
100
L21
L22
S836
138
STC TB 839-9
SPS TB 653-7
9
10
K645
SPS TB 653-8
STC TB 839-10
SWGR
52
b
CONT. SPRAY
PUMP #2 (#1)
SWGR
STC TB 839-11
137
STC J801-W
K643
STC J801
UU
AC
COMMON
J801
VV
L21
L22
S 837
140
STC TB 853-1
SPS TB 653-5
7
8
K645
SPS TB 653-6
STC TB 853-2
SWGR
52
b
CONT. SPRAY
PUMP #2 (#1)
SWGR
STC TB 853-3
139
STC J801-X
K644
PGE/PEG-385
8635 70/571
CHANGE
11
10
9
8
7

36 D 24 C B



NOTE:
SHOWN FOR TRAIN "A" INTERLOCKS. TRAIN "B" INTERLOCKS ARE IN PARENTHESIS.

CONTAINMENT SPRAY TEST
INTERLOCK CIRCUITRY

DFTM. R.W.KEMERER	8/21/73	Westinghouse Electric Corporation	
CHKR.		NUCLEAR ENERGY SYSTEMS, PITTSBURGH, PA., U.S.A.	
DES. ENG.		TITLE: PACIFIC GAS & ELECTRIC CO DIABLO CANYON UNITS 1 & 2	
MFG. ENG.			
MTLS. ENG.		SAFEGUARDS TEST CABINET	
APP. T.N.M.			
APP.		SCALE NTS	108D415
APP.		DIMENSIONS IN INCHES	SHEET-12
DFTG. SUPV.		DO NOT SCALE	SUB 1

6 5 4 3 2 1

C 24 D 36