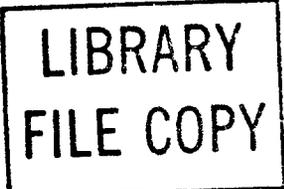


**HEAT TESTS—STORED PROGRAM CONTROL SYSTEM
RESTRICTIONS OF PLANT ACTIVITIES
PERSONNEL SAFETY GUIDELINES AND REQUIREMENTS**

GENERAL METHODS



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graph.

1.03 The title for each figure includes a number(s) in parentheses which identifies the paragraph(s) in which the figure is referenced.

1.04 Recommendations for changes to this section should be submitted on Form E-3973 as specified in Section 000-010-015, How to Comment on Bell System Practices.

2. BACKGROUND

2.01 Heat stress tests are recommended to be performed on the SPCS to identify temperature-sensitive electronic components that can malfunction within the ambient temperature operating range of 35°F to 120°F. During the test, the room temperature is gradually raised and controlled to a maximum of 120°F.

2.02 If equipment fails, repairs must be made "on site" before proceeding to a higher temperature. Due to the many variables involved in correcting equipment failures, it is impossible to predict the length of time personnel will be required to work in the heated environment. In order to reduce the likelihood of employees experiencing health problems related to overexposure, standard practices have been established to qualify assigned personnel medically and to protect them against overexposure during testing. Refer to Section 201-021-001, System Heat Testing Description and Methods—SPCS Stress Tests, for more information on heat testing.

1. GENERAL

1.01 This section provides a recommended standard for the personal safety of employees involved in heat stress tests of Stored Program Control Systems (SPCSs). It is intended to be a Bell Operating Company (BOC) guideline for evaluating an employee's health through all phases of the heat test, along with recommended procedures to be followed.

1.02 Whenever this section is reissued, the reason(s) for reissue will be listed in this para-

3. PERSONNEL PREPARATION

3.01 The names of all employees who will be assigned to Electronic Switching System (ESS) heat testing operations must be submitted to the

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company medical director in advance. This is to allow time for an employee medical record review and/or a medical evaluation. Employees involved include anyone that will be expected to be directly exposed to the heated test area for more than two hours throughout the testing interval when the room ambient temperature is 100°F or higher.

3.02 The medical records of these employees should be reviewed to determine if a recent medical evaluation has been completed which would provide, in the opinion of the medical director, sufficient information to allow placement on such operations. If no medical record exists for an employee, that employee should be instructed that a medical evaluation is required prior to participation in the heat tests and a medical record should be initiated.

3.03 Content of the examination should include the skin and the cardiovascular, renal, hepatic, endocrine, and respiratory systems. Any history of heat-related disorders or illnesses are of particular importance.

3.04 If an employee is evaluated for heat stress testing by a physician other than the company medical director, a written evaluation of the results must be forwarded to the medical director's office for review.

3.05 A Heat Stress Examination form should be presented to the examining physician by the employee, with written instructions to forward the completed form to the appropriate medical director's office. A sample Heat Stress Examination form is shown in Fig. 1. The first six lines of the form should be filled out by the employee. The name, address, and telephone number of the employee's supervisor should be recorded at the top of the form in order for the medical director to return the results.

3.06 Any employee not approved by the company medical director should not be allowed to participate in heat testing.

4. PLANNING

4.01 A pretest meeting of all approved personnel involved in heat testing, including engineering, maintenance, medical, and management, should be held to inform the attendees of proper precautions and to acquaint them with symptoms of heat-related problems. This meeting should be conducted by the

manager in charge of the test. Refer to paragraph 6.03 for information on physical symptoms of heat stress.

4.02 A Work Cycle Log should be presented and discussed at the pretest meeting. A sample Work Cycle Log is shown in Fig. 2A. The employees should be instructed on how to use the guide (Fig. 2B) and fill out the log. See paragraph 5.01 for an explanation.

4.03 A preliminary heat test schedule and list of employees performing the heat tests should be reviewed during the pretest meeting. Relief personnel should be scheduled in case any employee experiences difficulties during the heat test.

4.04 A list of emergency telephone numbers, ie, hospital, ambulance, nearest medical doctor, should be prepared, reviewed at the pretest meeting, and posted in the office during the test in case emergency medical help is needed.

4.05 Labor Unions, if involved, should be informed of the procedures and precautions the company is taking.

5. TECHNICAL PREPARATION

5.01 In the Work Cycle Log shown in Fig. 2A, recording (**Name**, **Date**, and **Recorder Temperature**), adhering to the time limits, and logging of **in** and **out** time is each employee's responsibility. However, this recording and the actual time spent in the heated area will be monitored and supervised by management. The manager in charge of the heat test is responsible for enforcing the work cycle and the accuracy of the log. A sample completed Work Cycle Log is shown in Fig. 3.

5.02 The Work Cycle Guide, established as a guideline for employees working in a heated area with temperatures equal to or exceeding 100°F is shown in Fig. 2B.

5.03 The Work Cycle Guide (Fig. 2B) presents time limits relative to light physical or mental work. On work judged to be more than light work, the time spent in the heated area should be reduced proportionally to the higher work level effort consistent for good health.

5.04 The work period spent outside the heated area should be in a nonheated, comfortable temper-

ature and may include light physical or mental work, ie, trouble diagnostics, routine analysis, etc. This area should be designated before heat testing begins.

5.05 The anticipated heat stress/exposure during ESS heat stress testing operations should not require significant amounts of fluid/electrolyte replacement. However, a convenient source of cool, potable water and a commercial thirst quencher, nonalcoholic and low sugar, for body water replacement should be made freely available. These products should be obtained locally.

5.06 A warning sign, eg, **DANGER—HEAT TEST**, should be posted at all possible points of entry to the heat test area. Only personnel who have been screened and approved by the company medical director should be allowed in the heat test area per Fig. 2B. This includes supervisory personnel monitoring the test.

6. PRECAUTIONS DURING TESTING

6.01 A temperature comfortable work area outside of the heated test area must be available to the employees involved in the heat test. All operations and trouble analysis that can be accomplished outside of the heated area should be encouraged. A remote maintenance teletype in the area can be used to enable the craft to perform these functions.

6.02 All personnel should be aware that prolonged exposure to excessive heat may cause irritability and anxiety, decrease morale, and reduce the ability to concentrate. Close observations by co-workers to each other should be encouraged for recognizing early symptoms.

6.03 The physical disabilities caused by excessive heat exposure are, in order of increasing severity, heat rash, heat cramps, heat exhaustion, and heat stroke. A brief description of each follows:

(a) **Heat rash** (prickly heat) may be caused by unrelieved exposure to hot and humid air. The orifices of the sweat ducts become plugged due to the swelling of the moist keratin layer of the skin which leads to inflammation of the glands. There are tiny red blisters visible in the affected skin area and, if the affected area is extensive, sweating can be substantially impaired. As a consequence, heat rash not only is a nuisance because of the discomfort it causes but can diminish the worker's capacity to tolerate heat.

(b) **Heat cramps** may occur after prolonged exposure to heat with profuse perspiration and inadequate replacement of salt. The signs and symptoms of heat cramps consist of spasms and pain in the muscles of the abdomen and extremities. Albuminuria may be a transient finding.

- **Albuminuria**—Presence of albumin in the urine often symptomatic of kidney disease

- **Albumin**—Any of numerous simple heat coaguable, water-soluble proteins that occur in blood plasma or serum.

(c) **Heat exhaustion** may result from physical exertion in a hot environment when vasomotor control and cardiac output are inadequate to meet the increased demand placed upon them by peripheral vasodilatation or the plasma volume is reduced by dehydration. Signs and symptoms of heat exhaustion may include palor, lassitude, dizziness, syncope, profuse sweating, and cool moist skin. There may or may not be a mild hyperthermia, observable by rectal measurement.

(d) **Heat stroke** is a serious medical condition. An important predisposing factor is excessive physical exertion. Signs and symptoms may include dizziness, nausea, severe headache, hot dry skin because of cessation of sweating, very high body temperature (usually 106°F and rising), confusion, collapse, delirium, and coma. Often, circulation is also compromised to the point of shock. If cooling of the victim's body is not started immediately, irreversible damage to vital organs may develop. Most significant is brain damage which could lead to death.

6.04 Any employee who develops a health problem during the test should be removed from the heated area and treated immediately.

6.05 Health problems or occupational illness resulting during or after the stress testing which seem related to exposure to the stress test environment should be reported **immediately** to the appropriate medical director's office. These problems should be recorded and retained in file as a part of the employee's medical record.

6.06 A post-test meeting should be held to discuss the results of the test. Personnel should be questioned to ensure that no employee was harmed

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during the test. All data should be documented and logged by the manager in charge of the test.

7. REFERENCES

7.01 The following references were used in producing this section:

REFERENCE	TITLE
SR 78-11-069*	Medical Evaluation for Employee Placement on Heat Testing of Stored Program Control Systems
SR 78-11-070*	Personnel Safety and Guidelines for Heat Testing
RL 79-02-043*	Revised Temperature and Low Voltage Tests for New Installa-

REFERENCE

RL 80-08-389*

EL 6745

BSP 201-021-001

*System Letter

TITLE

tions of Local Office Stored Program Control Systems

Recommends In-Service Stress Test—Local ESS and TSPS Offices—Heat and Low-Voltage Test on Stored Program Control Systems (SPCS)

Attachment Background and Planning Notes on In-Service Testing No-Cool, Heat and Low Voltage Tests

System Heat Testing Description and Methods—SPCS Stress Tests

RETURN A COMPLETED COPY TO:

SUPERVISOR'S NAME _____
 ADDRESS _____
 TEL. NO. _____

HEAT STRESS MEDICAL EXAMINATION

NAME _____ SS# _____
 DATE OF BIRTH _____

MEDICAL HISTORY:

GENERAL STATE OF HEALTH GOOD (), FAIR (), POOR ()
 CARDIOVASCULAR DISEASE _____
 KIDNEY OR LIVER DISEASE _____
 PREVIOUS HEAT STROKE OR EXHAUSTION _____
 OTHER _____

COMMENTS: _____

EXAMINATION:

HEIGHT	WEIGHT	BLOOD PRESSURE	PULSE	TEMPERATURE	URINE ANALYSIS

SKIN _____
 E.N.T. _____
 THYROID _____
 HEART & LUNGS _____

 NEUROLOGICAL _____

DETAILS OF SIGNIFICANT FINDINGS: _____

RECOMMENDATIONS: _____

THIS PERSON IS (), IS NOT () FIT TO PERFORM HEAT STRESS TESTS.
 DATE: _____ (PRINT) _____ (M.D.)
 _____ (SIGNATURE) _____ (M.D.)

Fig. 1—Sample Heat Stress Examination Form (3.05)

WORK CYCLE GUIDE

RECORDER TEMP (F°)	MAXIMUM TIME IN	MINIMUM TIME OUT
100	53 MIN.	7 MIN.
105	38 MIN.	22 MIN.
110	32 MIN.	28 MIN.
115	28 MIN.	32 MIN.
120	26 MIN.	34 MIN.

Fig. 2B. — Work Cycle Guide (4.02, 5.02, 5.03, 5.06)

WORK CYCLE LOG

NAME	DATE	TIME		RECORDER TEMPERATURE
		IN	OUT	
R. Griffith	12-5-80	1700	1702	100
D. Smith	12-5-80	1700	1715	100
R. Elicker	12-5-80	1720	1750	100
R. Ramsey	12-5-80	1825	1900	102
D. Smith	12-5-80	1825	1900	102
A. Skoda	12-5-80	2100	2128	104
J. Scanlon	12-5-80	2130	2140	104
J. Egg	12-6-80	0025	0032	106
A. Skoda	12-6-80	0100	0120	107
J. Egg	12-6-80	0304	0317	108
A. Skoda	12-8-80	0500	0519	109

NOTE: TO BE ADMINISTERED, MONITORED, AND SUPERVISED WHEN THE HEAT TEST AREA EXCEEDS 100°F.

Fig. 3—Sample Completed Work Log (5.01)