Documentation for the INSTRON and INSETUP Programs

Written by
W.C. Crone, Brown University, 1991

Revised by
V.M. Maher, University of Minnesota, 1996

1. Introduction

The INSTRON and INSETUP programs are designed to be used on an IBM PC with an EGA color graphics display attached to the Instron 4500 Series Testing Instrument with a Hewlett-Packard HP-IB Interface. The INSETUP program allows you to write a test setup file which includes all the test parameters in the proper format required by the INSTRON program. The test files created by this program have the extension .TST, and can be reused for test specimens with the same dimensions and test requirements. The INSTRON program is designed to provide real-time graphical display of data during a test, storage of the data in the .GF file (formatted for GF and GFX graphics software), and a test summary in the .RES file. The program also offers several function key options, which allow complete control of the test during data collection.

2. Some Testing Options

There are several versions of the INSTRON and INSETUP programs, which allow you to choose from various types of testing conditions. For the most up-to-date information on the INSTRON and INSETUP programs, or for special instructions and cautions, read the file called versions.dat, which is in the same directory as the executable files.

The programs available at this time are listed in the table below with basic attributes. Additionally, a brief description of each program is provided.

Table 1 INSTRON and INSETUP Programs

Instron Version	Insetup Version	No. of Speeds	A/D Signal	Remote Display	Stop	Hold	Multiple Test Files
Instron	Insetup	single					
InstronT	Insetup	single	1 thermo				
InstronD	Insetup	single	1 thermo	yes			
InstrDT5	Insetup	single	5 thermo	yes			
InstronX	Insetup	single	2 volt	yes			
InstronE	Insetup2	up to 20	1 thermo	yes			
InstronF	InsetupF	up to 20	1 thermo	yes	yes		
InstronG	InsetupG	up to 20	1 thermo	yes	yes	yes	
InstronH	InsetupG	up to 19	1 thermo	yes	yes	yes	yes
InstronL	InsetupG	up to 20	2 volt	yes	yes	yes	

INSTRON: This is the original code for running the Instron Machine. All other INSTRON programs are based on the code for this program. INSTRON allows one speed segment (speed is always positive), and the test can be controlled using the F4 and F5 keys. See Section 5, The INSTRON Program, for details about using the F4 and F5 keys. See Appendix 1 for an example of a test that was run using this program.

INSTRONT: This is a single-speed program with the ability to read a thermocouple through an A/D board. This program is now obsolete since all subsequent programs also have the thermocouple capability.

INSTROND: The new feature in INSTROND is the ability for remote display of the test while it is running. INSTROND also has the thermocouple feature from INSTRONT, and it allows one speed segment.

INSTRDT5: Version DT5 is a single-speed program that has the remote display option and can read 5 thermocouples on channels 1-5 of an A/D board. This is currently the only program that can read more than one thermocouple.

INSTRONX: This is a single-speed program that has the remote display capability and can read 2 A/D inputs - one as voltage and one as either voltage or a thermocouple. There is now a multi-speed version of this program called INSTRONL.

INSTRONE: This program has all the features of INSTROND (remote display and thermocouple capability), but allows the user to program up to 20 speed segments, which will move the crosshead up or down at the speed chosen for that segment. INSTRONE is now obsolete because all the following versions of the INSTRON program are also multi-speed programs.

INSTRONF: This is a multi-speed program with all the features of INSTRONE (thermocouple option, remote display option, up to 20 speed segments), plus it has a stop option, which allows you to program timed pauses into your test. You can stop the crosshead motion for a specific period of time during a test by choosing zero for a segment's speed. This allows you to have pauses in your test without having to rely on using the F4 key while the test is running. Note that INSTRONF will continue to collect data during preprogrammed pauses, but the F4 key stops data collection.

INSTRONG: This is a multi-speed program with all the features of INSTRONF (thermocouple capability, remote display option, up to 20 speed segments, stop option) plus a hold option. The hold option allows you to hold your specimen at a constant extension, load, or strain. To program a hold segment, choose zero for the segment's speed, and select the hold option. INSTRONG is the most general of the INSTRON programs, and should be adequate for most tests. See Appendix 2 for an example of a test that was run using this program.

INSTRONH: This program has all the features of INSTRONG, but allows you to run your test file many times in a row.

INSTRONL: This program has all the features of INSTRONG and has code added from INSTRONX to read 2 A/D channels - one as voltage and one as either voltage or a thermocouple.

3. The Files

There are four files associated with each test. The extensions are assigned to each file type as: .TST, .GF, .RES, or .BIN according to its function. You should never type an extension after a file name, since the extensions are automatically provided by the INSETUP and INSTRON programs. The directory can be accessed at the file name prompts to look at the existing files. (Type: DIR, or DIR∗.TST, etc.) The test setup file is created with the INSETUP program. The output files (.BIN, .RES, and .GF) are described in further detail in Section 6, Output Files and Plotting.

4. The INSETUP Program

The INSETUP program opens a test setup file with the extension .TST. This program asks for information about the specimen and testing conditions, and writes that information to the .TST file in a format that can be read by the INSTRON program. For most of INSETUP's requests and some of INSTRON's requests, a default value in <> is provided. This is either a common response or your previous response to the same question. This value is retained by simply pressing the carriage return. Both the INSETUP and the INSTRON programs use SI units: Newtons, Pascals, and millimeters.

There are several versions of the INSETUP program. (See Table 1 for information about which INSETUP programs are to be used with each INSTRON program). The INSETUP programs are:

> **INSETUP:** This program is used to write a test setup file for the single-speed INSTRON programs.
>
> **INSETUP2:** This program should only be used with INSTRONE. INSETUP2 is now obsolete since INSTRONE has been replaced with INSTRON versions F and G.
>
> **INSETUPF:** This is a multi-speed test setup file generator that should only be used with INSTRONF.
>
> **INSETUPG:** This is a multi-speed test file generator that should be used with INSTRON versions G,H, and L. INSETUPG has a tag at the beginning of the program that identifies it as the correct program to use with these versions of INSTRON, and these INSTRON programs will reject any test file that is not written with INSETUPG.

The INSETUP program first requests specimen information such as length and area. These values are used only in calculating strain limits, stress limits, and stress.

The next five requests are for test limit action and limit values. The test limit action tells the Instron what the crosshead's action will be when a limit is reached. It can be disabled, or set to stop or hold. When it is disabled, there are no extension or load limits set, and you must monitor your test carefully during a run. The stop limit action stops crosshead motion and data collection when any limit is reached. The hold limit action holds the crosshead at a fixed extension (same as stop), load, or strain. If the hold option is used, the INSETUP program will ask some additional questions at the end. When a limit is reached, the INSTRON program allows these limits to be reset or the test to be ended. Note that the maximum values should always be greater than the minimum values. Reasonable choices for the limit values are desirable, since they are used as scales for graphing the data on the screen.

INSETUP then requests the testing area and test type. You must specify whether the test will occur above or below the crosshead and whether the specimen will be in tension or compression.

The next two requests deal with the speed segments. Only one preprogrammed speed is available with the single-speed INSTRON programs. (Always use positive values for speed in the single-speed programs.) New speeds can be set during testing with option 4 of the F4 function key. Speed changes can be made during the run when the test has been stopped with the F4 or F5 function keys. All of the multi-speed INSTRON programs allow up to 20 preprogrammed speed segments, which reduces the need for the operator to continually monitor the test. Each segment is defined by a speed (always positive or zero), and an ending location or time. If you choose a non-zero speed, you then choose the displacement you want that speed to end at (that displacement can be greater or less than the previous location depending if you want the crosshead motion to be forward or backward). If you choose a speed of zero, you have several options. In INSTRONF, a speed of zero indicates a pause in the test. The crosshead stops for the amount of time that you specify for that speed segment. In INSTRON versions G,H, and L, a speed of zero gives you the option to stop for that segment (like in INSTRONF) or to hold extension (equivalent to stop), load, or strain. Test speeds should be given in millimeters per minute.

Next INSETUP asks for the period of data collection, which determines how often data is displayed and stored by the computer. Data display and storage can be performed as fast as once every 20 milliseconds. Small period values should only be used for very short tests or for data with high frequency content. Usual data collection periods are between 1000 and 4000 milliseconds (1 and 4 seconds).

The test time can also be limited if necessary. This allows you to set a maximum time limit so that the test will be stopped when this limit is reached. When zero is entered as the limit, this feature is disabled. Note that this limit is on the total test time - the test clock continues to run when the operator is making changes with the F4 and F5 function keys and during a preprogrammed hold.

Next INSETUP offers break and peak detection. These features are disabled by choosing a value of zero. When break and peak detection are enabled, the values at the break and/or the two peak values are automatically written to the .RES file. INSTRON detects the break when the load falls sharply below a certain percentage of the previous data point (40% is the default). When a break occurs, the crosshead motion and data collection are automatically stopped. The peak detectors are only available when the load level is above 2.5% of the maximum capacity of the load cell in use. A peak is recorded when the difference between the current load and the previous maximum exceeds the set value (5 Newtons is the default). When a peak occurs, the test values at the peak are automatically saved in the .RES file, but the test is not interrupted.

The INSETUP program then asks if there will be any holds during the test. All versions of the INSTRON program allow you to use the F5 function key during a test, and INSTRONG allows you to preprogram hold segments. If either preprogrammed holds or the use of the F5 key is desired, choose yes. (Note that the F5 key cannot be used during a preprogrammed hold segment, where it is temporarily disabled.) If the F5 key is enabled, the mode for the hold can be set to either extension, load, or strain. The extension mode has the same effect as the F4 stop key, but with the extra feature of plotting while stopped. The load and strain modes will hold the current value of load or strain for the set period of time. To program a hold segment, set the speed for that segment to a value of zero. The INSETUPG program will then allow you to choose to stop or to hold for that segment. In this case, the end of the segment is determined by a time limit, rather than by an extension. Then it asks for the maximum speed allowed to maintain the hold. The default value is the initial test speed, which was chosen earlier. This speed is adequate for most tests.

5. The INSTRON Program

To run the INSTRON program you must have previously made the .TST file using one of the INSETUP programs. INSTRON reads the data from the .TST file and uses those values to set up the test. It then sends all the necessary information to the Instron machine and records the data as the test is running. For most tests, INSTRONG would be the best version to use, since it is currently the most general of the INSTRON programs. If you have any special testing needs, refer to Table 1 or the file versions.dat for the most current description of the testing options.

When providing file names to INSTRON, do not include an extension. The INSTRON program will use the output file name to create three files with the extensions: .BIN for the binary data, .GF for data that has been converted to GF format, and .RES for a summary of the test setup, changes, and results.

In the programs that have thermocouple capability there are questions about the thermocouple set-up. INSTRON versions DT5, T, X, and L assume that you are using the correct channel(s) on the A/D board. INSTRON versions D,E,F,G, and H ask which channel you are using, and versions G and H ask for a comment about the thermocouple location, which will be printed in the .RES file as a reminder to the operator about how the test was set up.

The next entries, specimen name and operator name, are for the benefit of the operator. This allows you to identify the test sample and its preparation in the .RES file for future reference.

There are several checks built into the INSTRON program to ensure that the Instron machine has all the correct setup data. The INSTRON program will notify you if the GPIB computer control or the frame control are disabled. They should both be enabled during a test. Avoid enabling the Grip Control when no grips are attached, since that would cause the program to lock up. If the extension is not at zero, the program provides three options: you can keep the non-zero value, return the crosshead to its previous zero position, or reset the current position to zero. Note that Young's modulus calculations can only be performed when the initial extension is zero.

There are additional questions that INSTRON will ask only if there is an error in the .TST file data. This gives you the opportunity to change those values, but you cannot alter the original .TST file from the INSTRON program. You can make permanent corrections by editing the .TST file or by re-running the INSETUP program. Errors include using a negative test speed and using a minimum value that is greater than its corresponding maximum. Maximum and minimum values are also used for plotting purposes and can be changed during the test with the F4 key. If you chose no limit action in INSETUP, the INSTRON program will request limits so that it can construct a plot, but these limits will in no way affect the test.

The INSTRON program then gives you five choices for the x and y axes, and asks if you want it to calculate Young's modulus. The axis choices are: extension, load, strain, stress, and time. Strain should only be chosen if there is calibrated input into the Strain1 channel. The modulus function can be performed if you desire a value for Young's modulus or would just like to do a pretest of the specimen in its elastic range. You must choose a maximum extension value in the elastic range of the specimen. The data used to calculate Young's modulus is taken between half the maximum and half the minimum values. Only the data used in the calculations is plotted on the screen. Take care not to yield the specimen. The value for Young's modulus is stored in the .RES file, but all other data collected during the modulus function is discarded.

As the test is running, the current x and y values and the test time are displayed at the bottom of the screen, and TEST IN PROGRESS is written on the line above. If a limit is reached, the test is stopped automatically and the cause is printed on the screen. The program will then show the F4 options so that the test limits can be changed or the test ended.

The function keys available for use during the test are displayed on the screen. The F4 key (stop key) can be used at any time during a test, but the F5 key (hold key) can only be used if enabled in the .TST file by INSETUP and if the program is not currently running a preprogrammed hold segment. Any time F4 or F5 are triggered, the last set of data is stored in the .RES file to provide a complete history of the test with a record of all pauses and holds. TEST STOPPED is displayed at the bottom of the screen during F4 and TEST HOLDING is displayed during F5. The F4 options are:

> 0 = Q, quits the test without saving any data to the .GF file and the .RES file will be incomplete. Throughout the program, Q stands for this definition of quit.
>
> 1 = END, ends the test and stores all appropriate data in the .GF and .RES files.
>
> 2 = GO, resumes data collection where it left off (moving the crosshead in its original direction). The previous data and plot box will be replotted if any limits were changed. An additional return is required before any crosshead motion or data collection begins.
>
> 3 = COMM, allows comments to be written to the .RES file. (Example: COMMENTS ? photo 12 taken.)

4 = SPD, allows the crosshead speed to be changed, the new speed is reported in the .RES file.

5 = PER, allows the period of data collection to be changed. The new period is reported in the .RES file.

6 = LIM, allows the limits to be reset. The old limits are shown as defaults and can be reused simply by pressing the carriage return. When the test is restarted the screen is cleared and a new plot box is drawn with the changed limits. The data previously collected will be replotted and the tests will continue running when the operator presses the carriage return again.

7 = UNLD, moves the crosshead opposite to it original direction so that data can be collected during unloading. The appropriate load limit is reset to the the value requested (zero is the default). The unloading can also be stopped any time by F4. To reload, use option 2 in F4. This moves the crosshead in its original direction and uses its original limit values. This sequence can be repeated.

The F5 key, if enabled, holds the test at some constant value of extension, load or strain. From F5, the F4 function can be used to make any of the changes discussed above. The hold will be maintained until you restart data collection. During the hold, the plot on the screen is still active (except while executing F4 options) so that any creep or relaxation can be viewed. It should be noted that only the starting and ending points of a hold are stored since the points between should constitute a straight line.

The F7 through F10 keys can be used during the test to expand and contract the screen plot box for viewing purposes. These function keys do not change the set limits, only the plot's scale. The screen cannot be expanded beyond the set limits. The new scale values are shown in red, and and the original values are shown in green. These function keys do not alter the stored data, and no record of the plot scaling is kept.

6. Output Files and Plotting

When the test is ended by F4 option 1 or a break is detected, the binary data stored in the .BIN file during the test is converted to numeric data and placed in the .GF file. Closing test comments are then requested so that you can add any additional information to the .RES file. You can make a hard copy plot of the results with the GF or GFX programs.

Consult their manuals for instructions. The data in the .GF file is formatted to be read by the GF or GFX programs using the default file format settings. Four columns of data are always saved in the .GF file: extension, load, strain, and test time. The test time provides an accurate history of actions taken during testing, since the test time continues to run during any stops or holds. There are additional columns in the .GF files of some of the INSTRON programs. INSTRON versions F,G, and H also include a column of temperature data, and versions X and L include columns of data from the A/D inputs. If you edit the .GF file, make sure the number of data points provided at the top of the file matches the actual number of data points listed in the file.

Appendix 1 : Example Test using INSTRON and INSETUP

This appendix contains the test setup file, the .RES file, and the .GF file of a test on a Plexiglas cylinder. This test was run using the original INSTRON program.

Test Setup file made with INSETUP, PLEX.TST

THE NUMBER OF ENTRIES TO FOLLOW IS:

16

SPECIMEN LENGTH IN MILLIMETERS, 36

SPECIMEN CROSS SECTIONAL AREA IN MILLIMETERS SQUARED, 490

TEST LIMIT ACTION... 0 FOR NONE 1 FOR STOP, 1

MAXIMUM LOAD LIMIT IN NEWTONS, 100

MINIMUM LOAD LIMIT IN NEWTONS,−5000

MAXIMUM EXTENSION LIMIT IN MILLIMETERS, .1

MINIMUM EXTENSION LIMIT IN MILLIMETERS,−.5

TEST AREA... 0 FOR ABOVE CROSSHEAD 1 FOR BELOW CROSSHEAD, 1

TEST TYPE... 0 FOR TENSION 1 FOR COMPRESSION, 1

NUMBER OF SPEEDS TO BE SET, 1

INITIAL TEST SPEED IN MILLIMETERS PER MINUTE, .1

PERIOD OF DATA COLLECTION IN MILLISECONDS (MUST BE > 20), 500

TEST TIME LIMIT VALUE IN SECONDS (0 FOR NO LIMIT), 0

PERCENTAGE FOR BREAK DETECTION (0 TO DISABLE), 40

LOAD IN NEWTONS FOR PEAK DETECTION (0 TO DISABLE), 5

F5 HOLD KEY... 0 TO DISABLE 1 TO ENABLE, 1

HOLD MODE... 0 FOR EXTENSION 1 FOR LOAD 2 FOR STRAIN1, 1

HOLD SPEED IN MILLIMETERS PER MINUTE, .1

Results file, PLEX9.RES

TEST PERFORMED WITH INSTRON ON 07—11—1990 AT 15:41:47

SETUP FILE (INSETUP.BAS):	PLEX.TST
BINARY DATA FILE:	PLEX9.BIN
DATA FILE IN GF FORMAT:	PLEX9.GF
RESULTS FILE:	PLEX9.RES
GF FILE COLUMNS:	EXTENSION, LOAD, STRAIN, TIME
SPECIMEN NAME:	PLEXIGLAS CYLINDER
OPERATOR NAME:	CRONE
SPECIMEN LENGTH IN MILLIMETERS:	36
SPECIMEN AREA IN MILLIMETERS SQUARED:	490
LOADCELL FULL SCALE LOAD:	10000
EXTENSOMETER FULL SCALE STRAIN:	.2
FREQUENCY OF DATA COLLECTION IN MILLISECONDS:	500
TEST SPEED IN MILLIMETERS PER MINUTE:	.1
F5 HOLD KEY ENABLED FOR LOAD	
MAXIMUM HOLD SPEED IN MILLIMETERS PER MINUTE:	.1
INSTRON TIME BASE RATE:	500
TEST TYPE:	COMPRESSION
YOUNG'S MODULUS IN MEGAPASCALS:	1064.217
RANGE OF EXTENSION USED FOR MODULUS CALC.:	—.01 TO —.02 mm
TEST STOPPED AT (LOAD, EXT., TIME):	—1020.335 N, —.0521 mm, 20.48 s
NEW SPEED IN MILLIMETERS PER MINUTE:	.15
NEW PERIOD OF DATA COLLECTION:	1000
TEST STOPPED AT (LOAD, EXT., TIME):	—1246.473 N, —6.659999E—02 mm, 50.56 s
THE PEAK 1 LOAD IN NEWTONS:	—1284 OCCURRED AT: 51.52
NUMBER OF DATA POINTS STORED:	49
COMMENTS:	EXAMPLE TEST

.GF Format File: PLEX9.GF

C SETTUP FILE USED: PLEX.TST

C SPECIMEN NAME: PLEXIGLAS CYLINDER # 9

29

1−.1910E−01−.5088E+03+.1863E−09+.0000E+00

1−.1910E−01−.5085E+03+.1863E−09+.4800E+00

1−.1930E−01−.5089E+03+.1863E−09+.9800E+00

1−.2010E−01−.5273E+03+.1863E−09+.1480E+01

1−.2110E−01−.5430E+03+.1863E−09+.1980E+01

1−.2200E−01−.5566E+03+.1863E−09+.2480E+01

1−.2290E−01−.5699E+03+.1863E−09+.2980E+01

1−.2380E−01−.5829E+03+.1863E−09+.3480E+01

1−.2460E−01−.5959E+03+.1863E−09+.3980E+01

1−.2570E−01−.6087E+03+.1863E−09+.4480E+01

1−.2650E−01−.6215E+03+.1863E−09+.4980E+01

1−.2730E−01−.6343E+03+.1863E−09+.5480E+01

1−.2820E−01−.6473E+03+.1863E−09+.5980E+01

1−.2900E−01−.6602E+03+.1863E−09+.6480E+01

1−.2980E−01−.6727E+03+.1863E−09+.6980E+01

1−.3070E−01−.6855E+03+.1863E−09+.7480E+01

1−.3150E−01−.6982E+03+.1863E−09+.7980E+01

1−.3230E−01−.7113E+03+.1863E−09+.8480E+01

1−.3320E−01−.7240E+03+.1863E−09+.8980E+01

1−.3400E−01−.7367E+03+.1863E−09+.9480E+01

1−.3480E−01−.7494E+03+.1863E−09+.9980E+01

1−.3580E−01−.7626E+03+.1863E−09+.1048E+02

1−.3660E−01−.7752E+03+.1863E−09+.1098E+02

1−.3740E−01−.7879E+03+.1863E−09+.1148E+02

1−.3830E−01−.8007E+03+.1863E−09+.1198E+02

1−.3910E−01−.8133E+03+.1863E−09+.1248E+02

1−.3990E−01−.8266E+03+.1863E−09+.1298E+02

1−.4050E−01−.8392E+03+.1863E−09+.1348E+02

1−.4130E−01−.8522E+03+.1863E−09+.1398E+02

Appendix 2 : Complete Example Test, p2s12t9, run with INSTRONG

This appendix includes the test setup file, the .RES file, and part of the .GF file of a test on a Nickel-Titanium wire which displays pseudo-elastic behavior. It also includes a graph of the test, similar to the graph that would appear on the screen as the test is running, and a brief explanation of the test.

Test Setup file, test9.tst, made with INSETUPG

THE NUMBER OF ENTRIES TO FOLLOW IS:

16

VERSION, INSETUPG

SPECIMEN LENGTH IN MILLIMETERS, 129

SPECIMEN CROSS SECTIONAL AREA IN MILLIMETERS SQUARED, .333

TEST LIMIT ACTION... 0 FOR NONE 1 FOR STOP 2 FOR HOLD, 1

MAXIMUM LOAD LIMIT IN NEWTONS, 250

MINIMUM LOAD LIMIT IN NEWTONS,−10

MAXIMUM EXTENSION LIMIT IN MILLIMETERS, 11

MINIMUM EXTENSION LIMIT IN MILLIMETERS,−.1

TEST AREA... 0 FOR ABOVE CROSSHEAD 1 FOR BELOW CROSSHEAD, 1

TEST TYPE... 0 FOR TENSION 1 FOR COMPRESSION, 0

NUMBER OF SPEEDS TO BE SET, 15

INITIAL TEST SPEED IN MILLIMETERS PER MINUTE, 5

PERIOD OF DATA COLLECTION IN MILLISECONDS (MUST BE > 20), 250

TEST TIME LIMIT VALUE IN SECONDS (0 FOR NO LIMIT), 0

PERCENTAGE FOR BREAK DETECTION (0 TO DISABLE), 0

LOAD IN NEWTONS FOR PEAK DETECTION (0 TO DISABLE), 0

HOLDS DURING TEST?...0 = NO 1 = YES, 0

DISPLACEMENT LIMIT FOR INITIAL SPEED IS , 10.5

SPEED FOR SEGMENT 2 IS , 0

DATA RATE FOR THE TIME DELAY SEGMENT IS , 250

TIME LIMIT FOR SPEED 2 IS , 90

SPEED FOR SEGMENT 3 IS , 5

DISPLACEMENT LIMIT FOR SPEED 3 IS , 4.5

SPEED FOR SEGMENT 4 IS , 0

TIME LIMIT FOR SPEED 4 IS , 90

SPEED FOR SEGMENT 5 IS , 5

DISPLACEMENT LIMIT FOR SPEED 5 IS , 6.5

SPEED FOR SEGMENT 6 IS , 0

TIME LIMIT FOR SPEED 6 IS , 90

SPEED FOR SEGMENT 7 IS , 5

DISPLACEMENT LIMIT FOR SPEED 7 IS , 3.5

SPEED FOR SEGMENT 8 IS , 0

TIME LIMIT FOR SPEED 8 IS , 90

SPEED FOR SEGMENT 9 IS , 5

DISPLACEMENT LIMIT FOR SPEED 9 IS , 7.5

SPEED FOR SEGMENT 10 IS , 0

TIME LIMIT FOR SPEED 10 IS , 90

SPEED FOR SEGMENT 11 IS , 5

DISPLACEMENT LIMIT FOR SPEED 11 IS , 2.5

SPEED FOR SEGMENT 12 IS , 0

TIME LIMIT FOR SPEED 12 IS , 90

SPEED FOR SEGMENT 13 IS , 5

DISPLACEMENT LIMIT FOR SPEED 13 IS , 8.5

SPEED FOR SEGMENT 14 IS , 0

TIME LIMIT FOR SPEED 14 IS , 90

SPEED FOR SEGMENT 15 IS , 5

DISPLACEMENT LIMIT FOR SPEED 15 IS , 0

Results file, p2s12t9.RES

Note that the results file made by INSTRONG is much more complete than the results file made by INSTRON in Appendix 1. Most of the contents of the test setup file have been added to the results file so that the entire test setup is available, even if the .TST file is edited or lost.

TEST PERFORMED WITH INSTRONG ON 09—27—1995 AT 09:26:33

TEST FILE:	test9.TST
BINARY DATA FILE:	p2s12t9.BIN
DATA FILE IN GF FORMAT:	p2s12t9.GF
RESULTS FILE:	p2s12t9.RES
GF FILE COLUMNS:	EXTENSION, LOAD, STRAIN, TIME, TEMP
SPECIMEN NAME:	p2s12, inner loop test 9
OPERATOR NAME:	wccg
TEMPERATURE INPUT ON CHANNEL 1	
THERMOCOUPLE LOCATION:	near wire in ambient air
SPECIMEN LENGTH IN MILLIMETERS:	129
CROSS SECTIONAL AREA IN MILLIMETERS SQUARED:	.333
TEST LIMIT ACTION:	STOP
MAXIMUM LOAD LIMIT IN NEWTONS:	250
MINIMUM LOAD LIMIT IN NEWTONS:	—10
MAXIMUM EXTENSION LIMIT IN MILLIMETERS:	11
MINIMUM EXTENSION LIMIT IN MILLIMETERS:	—.1
TEST AREA:	BELOW CROSSHEAD
NUMBER OF SPEEDS:	15
INITIAL SPEED IN MILLIMETERS PER MINUTE:	5
FREQUENCY OF DATA COLLECTION IN MILLISECONDS:	250
TEST TIME LIMIT VALUE IN SECONDS (0 FOR NO LIMIT):	0
PERCENTAGE FOR BREAK DETECTION (0 TO DISABLE):	0
LOAD IN NEWTONS FOR PEAK DETECTION (0 TO DISABLE):	0
F5 HOLD KEY DISABLED	
DISPLACEMENT LIMIT FOR INITIAL SPEED IS:	10.5
SPEED FOR SEGMENT 2 IS:	0
DATA RATE FOR THE TIME DELAY SEGMENT IS:	250
TIME LIMIT FOR SPEED 2 IS:	90
SPEED FOR SEGMENT 3 IS:	5
DISPLACEMENT LIMIT FOR SPEED 3 IS:	4.5

SPEED FOR SEGMENT 4 IS:	0
TIME LIMIT FOR SPEED 4 IS:	90
SPEED FOR SEGMENT 5 IS:	5
DISPLACEMENT LIMIT FOR SPEED 5 IS:	6.5
SPEED FOR SEGMENT 6 IS:	0
TIME LIMIT FOR SPEED 6 IS:	90
SPEED FOR SEGMENT 7 IS:	5
DISPLACEMENT LIMIT FOR SPEED 7 IS:	3.5
SPEED FOR SEGMENT 8 IS:	0
TIME LIMIT FOR SPEED 8 IS:	90
SPEED FOR SEGMENT 9 IS:	5
DISPLACEMENT LIMIT FOR SPEED 9 IS:	7.5
SPEED FOR SEGMENT 10 IS:	0
TIME LIMIT FOR SPEED 10 IS:	90
SPEED FOR SEGMENT 11 IS:	5
DISPLACEMENT LIMIT FOR SPEED 11 IS:	2.5
SPEED FOR SEGMENT 12 IS:	0
TIME LIMIT FOR SPEED 12 IS:	90
SPEED FOR SEGMENT 13 IS:	5
DISPLACEMENT LIMIT FOR SPEED 13 IS:	8.5
SPEED FOR SEGMENT 14 IS:	0
TIME LIMIT FOR SPEED 14 IS:	90
SPEED FOR SEGMENT 15 IS:	5
DISPLACEMENT LIMIT FOR SPEED 15 IS:	0

LOADCELL FULL SCALE LOAD:	10000
EXTENSOMETER FULL SCALE STRAIN:	.1
INSTRON TIME BASE RATE:	500
TEST TYPE:	TENSION

TEST BEGAN AT 09:27:13 ON 09—27—1995

LIMIT REACHED:	LAST SPEED

TEST STOPPED AT (LOAD, EXT., TIME):	-1.839148 N, -.012 mm, 1176.48 s
NUMBER OF DATA POINTS STORED:	4704

COMMENTS:

The .GF file, p2s12t9.gf

This is a section of the .GF file associated with this test. Notice that the third line is the total number of data points in the file (in this case, 4704 data points are stored in the .GF file) Each line is one data point. In this file the first column is the extension, the second is the load, the third is the strain, the fourth is the time, and the fifth column is the temperature. You can also check the .RES file to find the column labels.

```
SETUP FILE USED: test9.TST
SPECIMEN NAME: p2s12, inner loop test 9
4704
1+.3000E-03+.5653E-01+.1496E-01+.0000E+00+.1994E+02
1+.2200E-01+.2418E+01+.1496E-01+.2240E+00+.1994E+02
1+.4270E-01+.4909E+01+.1496E-01+.4800E+00+.2015E+02
1+.6500E-01+.7741E+01+.1496E-01+.7360E+00+.2015E+02
1+.8500E-01+.1013E+02+.1496E-01+.9600E+00+.1992E+02
1+.1067E+00+.1270E+02+.1496E-01+.1248E+01+.1992E+02
1+.1266E+00+.1510E+02+.1496E-01+.1472E+01+.1992E+02
1+.1480E+00+.1761E+02+.1496E-01+.1728E+01+.1994E+02
1+.1681E+00+.1989E+02+.1496E-01+.1984E+01+.1992E+02
1+.1900E+00+.2232E+02+.1496E-01+.2240E+01+.1992E+02
1+.2099E+00+.2451E+02+.1496E-01+.2464E+01+.2015E+02
1+.2306E+00+.2677E+02+.1496E-01+.2720E+01+.2018E+02
1+.2500E+00+.2897E+02+.1496E-01+.2976E+01+.1992E+02
1+.2710E+00+.3120E+02+.1496E-01+.3232E+01+.1992E+02
1+.2904E+00+.3316E+02+.1496E-01+.3488E+01+.2015E+02
1+.3113E+00+.3536E+02+.1496E-01+.3744E+01+.1992E+02
1+.3307E+00+.3730E+02+.1496E-01+.3968E+01+.1992E+02
1+.3519E+00+.3940E+02+.1496E-01+.4224E+01+.2018E+02
1+.3716E+00+.4126E+02+.1496E-01+.4480E+01+.2018E+02
1+.3930E+00+.4327E+02+.1496E-01+.4736E+01+.2015E+02
1+.4127E+00+.4515E+02+.1496E-01+.4960E+01+.1992E+02
1+.4340E+00+.4715E+02+.1496E-01+.5216E+01+.2018E+02
1+.4543E+00+.4894E+02+.1496E-01+.5472E+01+.2018E+02
1+.4753E+00+.5081E+02+.1496E-01+.5728E+01+.2018E+02
1+.4954E+00+.5262E+02+.1496E-01+.5984E+01+.2015E+02
```

graph page

Appendix 3 : COMMAND NOT RECEIVED and ERROR Statements

If COMMAND NOT RECEIVED statements are displayed to the screen or you are unable to get beyond the GPIB NOT ENABLED statement then there is a problem with the GPIB Interface or Computer Control. At your first opportunity Quit the program or if the program is locked up see Appendix 4 for how to get out. First check to see if the Computer Control light is enabled on the console. If it is not enabled or you disabled it for any portion of time while in the INSTRON program, then enable it and run the program again. If this does not fix the situation, then check all connector cables to see if they are secure and do a console restart as described in Appendix 4.

Appendix 4 : Computer Lock Up or Catastrophic Failure

If catastrophic failure of the program occurs, the console should be restarted before the program is tried again. Console restart is done by disabling the computer control, pressing mode and then status on the console, scrolling until CONSOLE RESTART is found and then pressing enter on the console. Load and strain calibration will also have to be performed again. If the computer locks up (if the red led on the front of the computer is on or flashing, then it is storing data and you should wait for it to finish), then try simultaneously pressing control and C. If there is no change then try simultaneously pressing Shift and Break. As a last resort press Control, Alternate, and Delete to reboot the computer. If the computer must be rebooted it is a good idea to do a console restart to avoid additional problems.

Appendix 5 : INSETUP and INSTRON Program Structures

The INSTRON and INSETUP programs are written in BASIC using the MICROSOFT QuickBASIC compiler. There are two include files in the INSTRON and INSETUP programs: QBSETUP.BAS and GFEGA.SUB. There is also the QBHPIB.LIB library file that must be linked to the programs; see the HP-IB Manual for explanations. The environment library for compiling in QuickBASIC is QBHPIB.QLB. These programs have been compiled to stand alone so that only the .EXE files are needed to run the program.