



INSTRUCTIONAL MANUAL

**BRAKE PEDAL TRAVEL TESTER
MODEL KEI-095A**

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MODEL KEI-095A BRAKE PEDAL TESTER

GENERAL DESCRIPTION

The KEMKRAFT Model KEI-095A Brake tester is a precision test instrument which will display and record brake pedal travel, brake pedal effort, brake line pressure, and car deceleration during vehicle drive testing. Setup is accomplished in a few minutes with four transducers and a cigarette lighter plug. Data is stored in the Brake Tester for approximately 8 minutes of test time at the rate of 10 data readings per second. Multiple tests can be run and each test is identified by its start and stop time/date.

INSTALLATION

1. Open the KEI-095A Brake tester box and remove the two pedal transducers and power cable.
2. Place the Floor transducer on a stable area of the car with the front line marking facing toward the front of the car. Align the transducer so that the axis of the transducer is exactly parallel to the centerline of the car. See figure 1. Rotate the transducer so that the number label faces up.
3. Place the Pedal transducer on the pedal arm. Lock the fixture securely in place. Adjust the multi-axis fixture so that the transducer is level and parallel to the centerline of the car. Rotate the transducer so that the number label faces up, with the wires toward the front of the car.

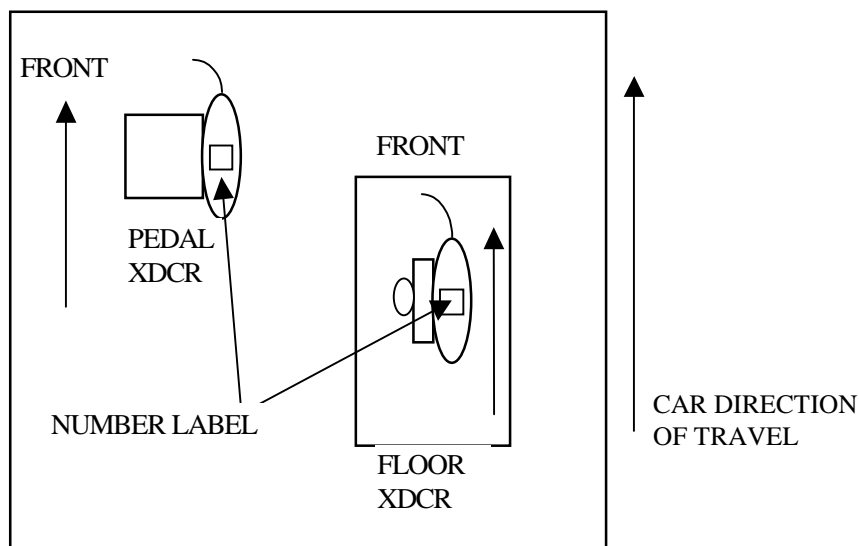


Figure 1

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4. If the Pedal force transducer is used, place it on the brake pedal and secure it firmly in place.
5. If the Brake Pressure transducer is used, install it on the master cylinder using an adapter(user supplied). The threads are 1/4-18 NPT Male. If the Brake Pressure Transducer is not being used, a terminating plug (KE095P1) for the Pressure connector is supplied.
6. Route all transducer cables so that they do not interfere with pedal operation. The cables must have enough slack to move freely without binding.
7. Plug the transducer cables and the power cable into the Brake tester. The brake tester connectors are marked and keyed so no damage can occur from incorrect cable connection.
8. **Start the car** and plug the power cable into the car cigarette lighter.
9. Turn the Brake Tester on. The start-up screen will be displayed. Press any key to enter the Main menu.

MAIN MENU

0 = Start Test
1 = Calibrate
2 = System Setup
3 = Download Data

10. Press the 2 key to enter the system setup menu and press the 1 key again to display the pedal angles. **Do not press the 0 key to ZERO XDCR's.**
11. Adjust the pedal and floor transducers so that their angles read less than +/- 2 degrees. Adjust the transducer angles by loosening the center thumb screw slightly, adjusting the transducer, and *carefully* re-tightening the screw.

The installation is now complete. Press the * key twice to return to the main menu and the tester is ready to be used.

OPERATION

The operation of the KEI-095A Brake Tester is controlled by various menus. Select the required operation from the menu using numbers on the keypad. Any entered data is entered on the keypad. Decimal points are added automatically.

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To run a normal test:

1. Be sure all setup is complete as detailed in the Installation section. Be sure the car is running. Turn on the Brake Tester power switch. Always start and stop the engine with Brake Tester power off.
2. Press the 0 key to select START TEST. The Test menu will be displayed. Press the 0 key again to start the test.
3. A menu screen will display that shows the functions of each key during testing. Press any key to start the test.

0 = Zero All XDCRs
1 = Data Col STR/STP
3 = Reset Peak
* = ABORT

4. The test screen will now be displayed.

TRAV:	0.0	0.0
FRCE:	0.0	0.0
DCEL:	0.0	0.0
PRES:	0.0	0.0

The current value is displayed in the first data column and the greatest positive or negative peak value is displayed in the second data column.

The Units are:

Travel = Inches

Force = Lbs.

Decel = 32 FT/sec² - Based on 45 Deg. = 1G.

Pressure = PSI

5. With the engine on, the shifter in park, and your foot off the brake pedal, press the **0 key to Zero** all values. The Brake tester will store the zero values until the unit is switched off.
6. While testing, the **Peak** value can be reset by pressing the **3 key** at any time. **This has no effect on data storage or any other reading, it resets the displayed peak only.**

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7. To begin **data storage** at any time press the **1 key**.

This data storage screen will now be displayed.

R:000	0.0	0.0
T:000	0.0	0.0
S:.10	0.0	0.0
RUN:	0.0	0.0

The first line of the test screen R:000, indicates that the brake tester is now collecting data. The number will begin counting upward to indicate how much memory has been used.

The second line of the test screen T:000, tells you the total memory that has been used. The memory is full when the display reaches T:455.

The third line of the test screen S:00, indicates the number of samples per second.

The fourth line of the test screen will change to RUN, indicating that the Brake Pedal tester is in data acquisition mode.

To stop data collection at any time, press the 1 key again.

The start and stop time of each test (pressing the 1 key) is recorded and stored in memory to identify tests.

8. Press the * key at any time to abort the data collection and return to the test menu. If data collection is in progress, when the * key is pressed, the data collection will be stopped and the data end time stamped with the current time.

SYSTEM SETUP

Certain system parameters must be modified when changing to a new vehicle or adjustment is required. The pedal length from pivot point to the middle of the brake pedal must be changed when switching to a new vehicle.

The clock should be checked for accuracy and reset for daylight savings time.

To enter a new pedal length:

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1. Turn on the brake tester. Press any key to display the main menu.
2. Press the 2 key to enter the System Setup Menu.

The System Setup Menu will be displayed.

1 = XDCR Angles
2 = Set Pedal Length
3 = Set Time/Date
* = Abort

3. Press the 2 key to change the pedal length.
4. The display will show the current pedal length. Enter the Four numbers of the new pedal length on the keyboard. Be sure to enter any leading zeros and the hundreds place decimal point will be entered automatically.
5. When the fourth number is entered, the display will go back to the Main Menu. The new pedal length is stored in memory and will remain until it is changed again.

To enter a new time and date:

1. Turn on the brake tester. Press any key to display the main menu.
2. Press the 2 key to enter the System Setup menu. Press the 3 key to set the time and date.
3. The display will show the current time and date.
4. Press the 1 key to change the time if required.
5. Enter the new time, in 24 hr format (1:00 pm = 13:00:00), on the keypad. Enter a 2 number hours, 2 number minutes, and 2 number seconds. The display will return to display the new time.
6. Press the 0 key to change the date if required.
7. Enter the new date on the keypad. Enter a 2 number months, 2 number days, and the last 2 digits of the year. The display will return to display the new date.
8. Press the * key to return to the System Setup and main menus.

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TRANSDUCER CALIBRATION

The KEI-095A brake tester works by comparing the angle on the brake pedal level transducer to the angle of the floor transducer. The angles must be the same from each transducer. Because the pedal travel and deceleration values are derived from these angles, the angles must be accurate for the system to be accurate. **Periodic re-calibration of the system is necessary.**

Calibration requires a Calibration Stand Model KE095CS that has four precision +/- angles, and zero, to set the pedal and floor transducers to, a precision known weight for the force transducer, and a Pressure Calibration box Model KE095CB that has a precision known value for the pressure transducer.

To calibrate the Angle Transducers:

1. Connect the KEI-095A brake tester to a 12.6 to 15 volt, 500 ma power supply. Connect all transducers to their brake tester ports.
2. Turn on the brake tester. Press any key to display the main menu.
3. Mount pedal angle transducer and floor angle transducer to the calibration stand. **Make sure the number labels on both transducers are facing up.**
4. Press the 2 key to enter the System setup mode. Press the 2 key to set the pedal length. **Enter 07.000"** as the pedal length. This is required to calibrate the transducers using Calibration stand KE095CS. Press * to return to the Main menu.
5. Press the 1 key to enter the Calibration mode.
6. To prevent unwanted access to the calibration modes a numeric code must be entered. Enter "1", "2", "3", "4" on the keypad.

The calibration menu will be displayed.

----- Calibration Menu ----- 1 = Cal Angle XDCRs 2 = Cal Force XDCR 3 = Cal Press XDCR

7. Press the 1 key to calibrate both transducers at the same time.
8. The display will show the current raw transducer output. For the angle transducers, place the calibration stand on a level surface and adjust the transducer so that the reading is as close to zero as possible. Press the 1 key when close to 0.00 degrees.

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9. The display will instruct the operator to set the angle transducers to a known negative angle. The recommended first angle is -60 degrees, however any angle 0 to -99.999 degrees can be used. Set the transducers to the angle and enter the 5 digits of the angle (60.000) on the keyboard.
10. When the fifth number is entered, the display will show the next recommended angle to be entered.
11. The display will instruct the operator to set the angle transducers to the next negative angle. The recommended angle is -45 degrees, however any angle from 0 to the previous angle can be used. Set the transducers to the angle and enter the 5 digits of the angle (45.000) on the keyboard.
12. When the fifth number is entered, the display will go show the next recommended angle to be entered.
13. The display will instruct the operator to set the angle transducers to the next negative angle. The next recommended angle is -30 degrees, however any angle from 0 to the previous angle can be used. Set the transducers to the angle and enter the 5 digits of the angle (30.000) on the keyboard.
14. The display will instruct the operator to set the angle transducers to the next negative angle. The next recommended angle is -15 degrees, however any angle from 0 to the previous angle can be used. Set the transducers to the angle and enter the 5 digits of the angle (15.000) on the keyboard.
15. The display will instruct the operator to set the angle transducers to the zero angle. The recommended angle is 0 degrees, however any angle from the previous angle to the next angle can be used. Set the transducers to the zero angle and enter the 5 digits of the angle (00.000) on the keyboard.
16. The display will instruct the operator to set the angle transducers to the first positive angle. The recommended angle is 15 degrees, however any angle from 0 to 99.999 can be used. Set the transducers to the angle and enter the 5 digits of the angle (15.000) on the keyboard.
17. The display will instruct the operator to set the angle transducers to the next positive angle. The recommended angle is 30 degrees, however any angle greater than the previous angle can be used. Set the transducers to the angle and enter the 5 digits of the angle (30.000) on the keyboard.
18. The display will instruct the operator to set the angle transducers to the next positive angle. The recommended angle is 45 degrees, however any angle greater than the

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- previous angle can be used. Set the transducers to the angle and enter the 5 digits of the angle (45.000) on the keyboard.
19. The display will instruct the operator to set the angle transducers to the last positive angle. The recommended angle is 60 degrees, however any angle greater than the previous angle can be used. Set the transducers to the angle and enter the 5 digits of the angle (60.000) on the keyboard.
 20. When the last angle is entered, the display will read "Calibration Complete".

Calibrate all transducers and check the angle values using the System Setup menu XDCR Angles display.

To calibrate the Pedal Force Transducer:

1. Connect the KEI-095A brake tester to a 12.6 to 15 volt, 500 ma power supply. Connect all transducers to their brake tester ports.
2. Turn on the brake tester. Press any key to display the main menu.
3. Press the 1 key to enter the Calibration mode.
4. To prevent unwanted access to the calibration modes a numeric code must be entered. Enter "1", "2", "3", "4" on the keypad. The calibration menu will be displayed.
5. Press the 2 key to calibrate the pedal force transducer.
6. The display will show the current raw transducer output. For the pedal force transducer, just place on a level surface. Press the 0 key.
7. Place a known weight from 05.00 to 99.00 lbs. on the transducer and enter the four numbers of the weight on the keypad. Be sure to enter any leading zeros and the decimal point will be entered automatically.
8. When the fourth number is entered, the calibration is complete. Press the * key to exit the calibration mode.

To calibrate the Brake Pressure Transducer:

1. Connect the KEI-095A brake tester to a 12.6 to 15 volt, 500 ma power supply. Connect all transducers to their brake tester ports.

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2. Connect the pressure transducer through the KE095CB with the cable and transducer.
3. Turn on the brake tester. Press any key to display the main menu.
4. Press the 1 key to enter the Calibration mode.
5. To prevent unwanted access to the calibration modes a numeric code must be entered. Enter "1", "2", "3", "4" on the keypad. The calibration menu will be displayed.
6. Press the 3 key to calibrate the brake pressure transducer.
7. The display will show the current raw transducer output. For the brake pressure transducer set the calibration box switch to ZERO. Press the 0 key.
8. Set calibration box switch to CAL. Enter the 5 digit calibration number that is on the label on the front panel. Each pressure XDCR has it's own CAL# depending on the serial number of the transducer.
9. When the fifth number is entered, the calibration is complete. Press the * key to exit the calibration mode.

DOWNLOADING DATA

The KEI-095 Brake Tester can store data for download to a computer and further analysis. The Kemload32 program and the Download menu are used for this purpose. After downloading the data, the memory can be reset using the same menu.

To download data:

1. Connect the KEI-095 Brake Tester RS-232 port to the computer COM1 port. The connections are detailed in the following menu. Turn on the Brake tester.

CABLE CONNECTIONS ARE:

KEI-095 RS-232 (9 Pin) D-Type

Pin 2 (RxD)

Pin 3 (TxD)

Pin 5 (GND)

COMPUTER COM1 (9 Pin) D-Type

Pin 2 (TxD)

Pin 3 (RxD)

Pin 5 (GND)

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2. From Windows 95/98 start the KEMLOAD32 program.
3. From the KEI-095 main menu press the 3 key. The Download Data Menu will be displayed.

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----- Download -----  
5 = Download Data  
9 = Reset Memory  
Press * to Abort
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4. Verify Kemload32 download program baud rate is set to 9600. To set the baud rate to 9600 pull down OPTIONS menu and select serial port configuration.
5. Press the 5 key to begin the data download. If the Download Error message is displayed, check the cable.
6. The data will display on the computer screen as it is being received by the computer. When the download is complete, both the computer and Brake tester will indicate this.
7. If the data is to be saved on disk, select file then, Save...or Save as... The data will be automatically saved to a file upon successful download. This auto save feature can be disabled in the properties menu.
8. The data remains in the KEI-095 Brake tester memory and can be download as many times as desired. To clear the memory and reset the pointer to T:000, select the Download menu and press the 9 key to reset memory. **** NOTE:**** Be sure no important data remains in the Brake Tester memory before clearing or resetting it as all data is irretrievably lost.

DOWNLOADING DATA

The KEI-095A Brake Tester can store data for download to a computer and further analysis. The DOS Kemload program and the Download menu are used for this purpose. After downloading the data, the memory can be reset using the same menu.

To download data:

1. Connect the KEI-095A Brake Tester RS-232 port to the computer COM1 port. The connections are detailed in the help menu of the KEMLOAD program (press F1 in KEMLOAD). Turn on the Brake tester.

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CABLE CONNECTIONS ARE:

KEI-095 RS-232 (9 Pin) D-Type	COMPUTER COM1 (9 Pin) D-Type
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Pin 2 (RxD)

Pin 2 (TxD)

Pin 3 (TxD)

Pin 3 (RxD)

Pin 5 (GND)

Pin 5 (GND)

2. From the KEMLOAD directory, type KEMLOAD <CR> on the computer to start the Kemload program. Press F4 to change the data file name if desired.
3. From the main menu press the 3 key. The Download Data Menu will be displayed.

----- Download -----

5 = Download Data

9 = Reset Memory

* = Abort

4. Press the 5 key to begin the data download. If the Download Error message is displayed, check the cable and be sure the last line of the Kemload Computer screen reads "Waiting to receive data".
5. The data will display on the computer screen as it is being received by the computer. When the download is complete, both the computer and Brake tester will indicate this.
6. The KEMLOAD program allows the data to be edited before being saved. Press F3 to edit the file. If the data is to be saved on disk, press the F2 key to save. Data is not permanently stored on disk until F2 is pressed.
7. The data remains in the KEI-095A Brake tester memory and can be download as many times as desired. To clear the memory and reset the pointer to T:000, select the Download menu and press the 9 key to reset memory. **** NOTE:**** Be sure no important data remains in the Brake Tester memory before clearing or resetting it as all data is irretrievably lost.
8. Press F10 to exit the KEMLOAD program. Press the Brake tester * key to exit the download menu.

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*****OPTIONAL*****

REAL TIME DATA DOWNLOAD TO PC

GENERAL DESCRIPTION

The KEMKRAFT Model KEI-095A Brake Pedal Tester with optional KEI-095RT Download Utility software has the ability to download data in real time. The KEI-095A firmware must be at least version 1.8. This feature is desirable when you are doing multiple test runs and need to display and store the information while conducting the test. The software allows you to capture large amounts of information without the worry of using up the memory in the KEI-095A before the testing is complete.

SETUP

1. Install KEMLOAD.EXE and KEI095RT.CFG files on to your computer and run KEMLOAD.EXE at the C:\KEMLOAD\ <Prompt> or you can run this software from the floppy provided.
2. This software has the same capabilities as the standard KEMLOAD Program EXCEPT now the data displayed can be downloaded to a PC in real time.
3. To download the data collected in memory from the KEI-095A follow the procedure outlined in the DOWNLOAD section of this manual.
4. The new KEI095RT program has an added function key [F7] to signal the KEI-095A to dump the data displayed to the PC. This display data dump does not effect collection of data in the memory of the KEI-095A Brake pedal tester.
Data to be collected in memory can be started and stopped while the data is also being dumped to the PC.

OPERATION

5. With the KEI-095A all setup and ready to run a test , **Press F7** on the PC to start the real time download. (Maximum data collection in KEMLOAD is around 14,000 lines or about 20 - 25 min. of continous data dump depending on available base memory of the P.C.)
6. To stop real time download to the PC press the KEI-095A's * **Key to Abort**. This will stop the data dump to the PC and data collection in memory on the KEI-095A, if the internal memory storage is running.

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7. To Save, Edit, Rename , Clear the data on the PC the procedure is the same as is outlined in the Download section of this manual.

STANDARD EQUIPMENT

1. PEDAL TRANSDUCER
2. FLOOR TRANSDUCER
3. PEDAL FORCE TRANSDUCER
4. BRAKE PRESSURE TRANSDUCER AND CABLE
5. BRAKE PRESSURE CALIBRATION BOX -KE095CB
6. BRAKE PRESSURE PORT PLUG -KE095P1
7. AC POWER CORD
8. 12 VDC POWER CORD
9. MANUAL - KEI-095A BRAKE PEDAL TRAVEL TESTER
10. SOFTWARE 3 1/2" DISKS
 - A. KEMLOAD32 for WIN 95/98
11. CALIBRATION STAND-KE095CS