S U N   E L E C T R I C   E U R O P E

OPERATOR'S MANUAL

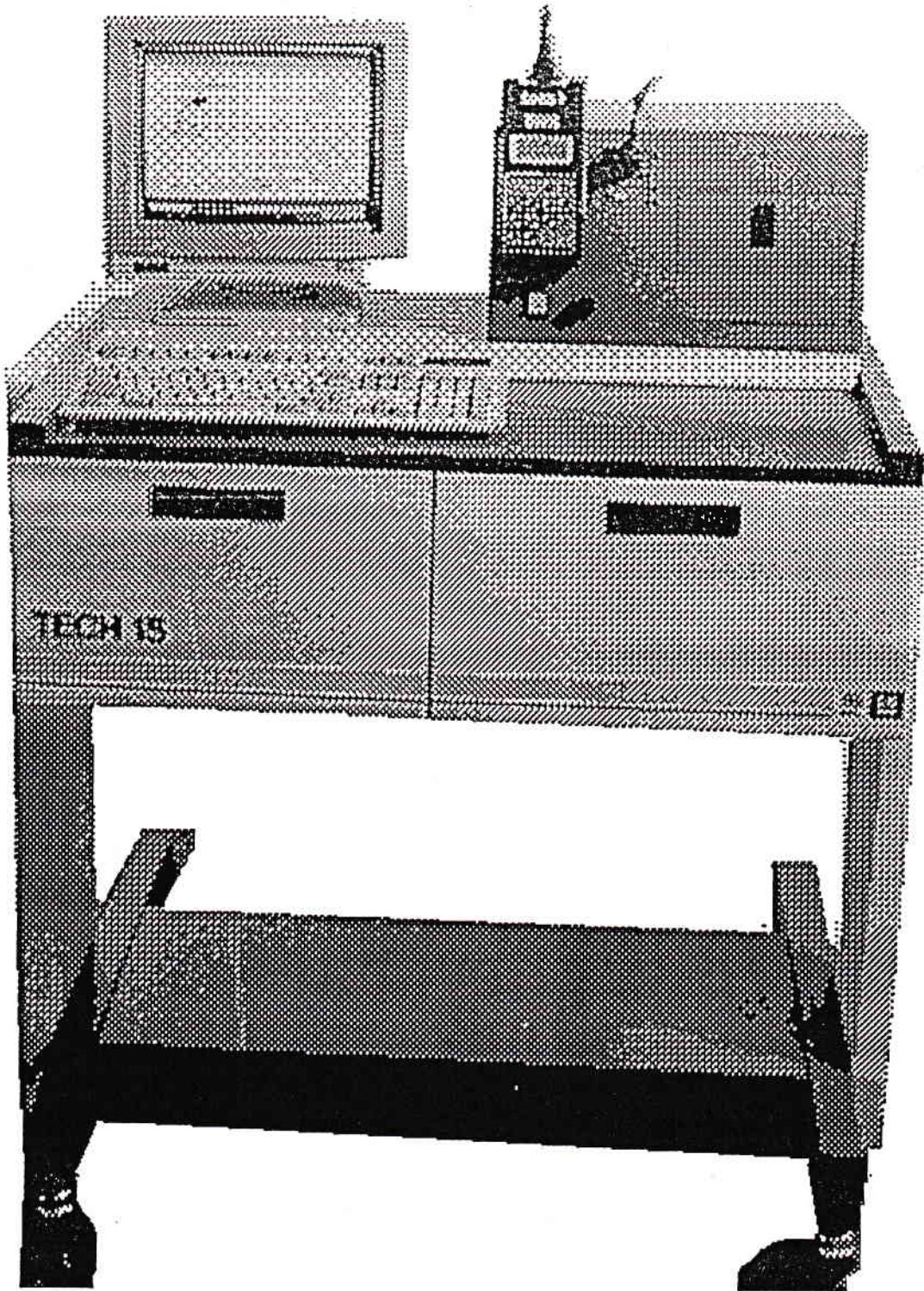TECH 15

APRIL-1991

<u>PART NO</u>: 0692E9306-66   <u>REV</u>: C

<u>REF FILES</u>: TECH15-1.DOC
            TECH15-2.DOC
            TECH15-3.DOC

OPERATOR'S MANUAL

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TECH 15

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1ST EDITION APRIL-1990

REVISION: C, APRIL-1991

TECH 15 APRIL-91

DISCLAIMER OF WARRANTIES

AND LIMITATION OF LIABILITIES

The staff of SUN ELECTRIC EUROPE B.V. has taken due care in the preparation of this manual. However, nothing contained herein modifies or alters in any way the standard terms and conditions of the sun purchase agreement, lease agreement or rental agreement by which this equipment was acquired, nor increases in any way SUN's liability to the customer.

In no event shall SUN ELECTRIC EUROPE B.V. or any of its subsidiaries be liable for incidental or consequential damages in connection with or arising from the use of this manual, equipment or software contained herein.

The warranty on the keyboard will be invalidated if the self adhesive plastic protective cover is removed.

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TECH 15 APRIL-91

SECTION 1

INTRODUCTION

TECH 15 APRIL-91

SECTION 1

INTRODUCTION

This manual is divided into sections as outlined in the table of contents and is intended to provide the operator with information on the following:

SECTION 1:   INTRODUCTION

This section provides the operator with some basic information on how the operator's manual is designed.

NOTE: IT IS IMPERATIVE THAT THE SECTION ON SAFETY PRECAUTIONS SHOULD BE READ BEFORE ATTEMPTING TO OPERATE THE SYSTEM.

SECTION 2:   THE OWNER'S GUIDE

The owner's guide provides the TECH 15 user with a basic explanation of the function and operation of the system. The components and controls are illustrated and discussed. Initial operating procedures and general operating basics are provided.

SECTION 3:   OPERATING INSTRUCTIONS

The OPEL/VAUXHALL TECH 15 is a microcomputer-based, technical service information system that allows quick and easy retrieval of service information. The system is designed to assist technicians in servicing/repairing vehicles the first time.

This section is intended to provide the operator with detailed information on the actual operation of the system.

SECTION 4:   MAINTENANCE AND SERVICE

This section explains what can be done if problems arise with the system. It may not give the absolute answer, but should at least point the operator in the right direction. Should the problem(s) be more serious, contact the nearest SUN SERVICE CENTRE.

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THE TECH 15 COMPONENTS

The TECH 15 is mounted on a sturdy, roll-around cabinet that enables operation virtually anywhere in the (work)shop. The TECH 15 consists of the following main components:

1:     The TECH 15 Cabinet which contains:

       A: The CPU Bay, (G2-386 Computer)

       B: The Printer Drawer, (Epson LQ 850)

       C: The Operating Console, TECH 1 Support Bracket and Disk Storage drawer.

2:     The Colour Monitor

3:     The Keyboard

The TECH 15 Assembly & Installation and System set-up is provided by SUN ELECTRIC Service Personnel.

****

SAFETY PRECAUTIONS

GENERAL

This system is designed and tested in accordance with IEC publication 348, SAFETY REQUIREMENTS for ELECTRONIC MEASURING APPARATUS, this system meets Safety Class 1. A description of Safety Class 1 is given in IEC Publication 348.

The system is supplied in a safe condition. In order to keep it in a safe condition and to ensure safe operation of the system, the instructions must be followed and the warnings & cautions must be observed.

ABOUT WARNINGS

A Warning gives instructions to prevent injury to people. Warnings will be given in the following list and just before the subject in this book where the warning is applicable to.

WARNINGS

1. Before applying mains power to the system, make sure that the power cable is plugged in a proper power outlet. (Refer to the Serial Number plate on the rear of the Cabinet for mains power requirements). A too high voltage can damage the system and make it unsafe.

2. Only use fuses with the fuse rate which is indicated near the fuse holder. The use of incorrect fuses can damage the system or the power cable and make these items unsafe.

3. A. Do not make connections to a vehicle before the mains cable of the system is connected to the proper socket outlet.
   B. Plug the mains cable in a socket outlet with a protective earth contact.
   C. Do not disconnect the mains cable before disconnecting the connections to the vehicle.
   If the system is not connected to earth dangerous voltages can be present on the casing of the system.

4. Do not open the cabinet. There are high voltages at several points inside the system.

5. Do not operate the system when:
   - It is warmer than 40 °C
   - It is colder than 5 °C
   - The relative humidity is higher than 80 %
   When the system is used outside of these operating limits its functionality may decrease.
   At temperatures lower than -10 °C the system may become unsafe.

6. Do not operate the system before contacting the local SUN SERVICE Center, when the system:

   - Shows visible damage
   - Fails to perform the intended measurements
   - Has been subjected to prolonged storage under unfavourable conditions
   - Has been subjected to severe transportation stresses.

   It is possible that these conditions can make the system unsafe.

7. Place wheel chocks in front and at the rear of the drive wheels before testing a vehicle. This is to prevent the vehicle from moving.

8. Do not inhale exhaust gases. Work in a properly ventilated area. Exhaust gases contain CARBON MONOXIDE (CO) which is a colourless and odourless lethal gas.

9. High voltages are present on the secondary side of the ignition system. Always use an insulated pliers when handling the ignition system components while the engine is running.

10. Wipe up fuel spills immediately and dispose of soaked rags in proper airtight containers. The soaked rags produce fumes which are explosive.

11. Never smoke near gasoline. Gasoline fumes are explosive.

12. Do not open closed coolant systems while the fluid is HOT. Steam will escape which can cause serious burns.

13. Never look directly into the carburettor throat when cranking or running the engine. Backfiring can cause burns.

14. Avoid contact with hot surfaces such as:

   - Exhaust manifolds and pipes
   - Mufflers
   - Catalytic converters
   - Radiators and hoses.

   These can cause SERIOUS BURNS.

15. Never use a naked flame near the battery. Batteries produce a hydrogen gas which explodes when it comes in contact with fire.

16. Keep a fire extinguisher in the work area. The extinguisher should be suitable for a range of uses including gasoline, chemical and electrical fires.

17. Do not lay tools or equipment on the battery. Accidental shorting of the battery terminals can cause shocks and burns, and damage the vehicle wiring or the battery itself.

18. Battery acid can damage clothing and burn skin or eyes. If contact is made with battery acid, wash the affected area with as much water as possible and use a weak soda (such as baking soda) to neutralise the acid. If acid enters the eyes, consult with a doctor or a medical person immediately.

19. Safety goggles should be always worn while working on a vehicle to protect the eyes from acid, dust, gasoline and any other loose objects that may come from any moving parts.

20. Do not wear a necktie, scarf or loose clothing near an operating engine. Keep hands and hair away from moving engine parts such as fan blades, belts or pulleys. These can cause a serious injury.

21. Never wear wrist watches, rings or other jewellery when working on a vehicle. Such items may catch on moving parts or cause an electrical short circuit and burning the wearer.

22. Do not operate the timing light too near fans or belts. The timing light has the effect of making the fan seem to "STAND STILL". This is a dangerous optical illusion which might cause the operator to contact the fan.

23. Keep hands and other objects away from the electric cooling fan. The fan can start up at any time.

ABOUT CAUTIONS

Cautions give instructions to prevent damage to equipment. Cautions will be given in the following list and just before the subject the caution is applicable to.

CAUTIONS

1. Check the engine oil level and add oil if necessary before performing any test. An engine should not be tested if the oil level is too low. The test results will be influenced and the engine can be damaged if a test is performed with a low oil level.

2. Check the coolant level and add coolant if necessary before performing any tests. An engine should not be tested if the coolant level is too low. If the engine is hot, check the level at the overflow tank. The test results will be influenced and the engine can be damaged if a test is performed with a low coolant level.

3. Follow the car manufacturer's instructions when working on vehicles with a catalytic converter. The converter can be damaged by backfires or by too much unburned fuel getting into the exhaust system.

4. Keep the test leads away from hot surfaces or moving engine parts. The test leads can not withstand high temperatures or severe mechanical stress.

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SECTION 2

OWNER'S GUIDE

SECTION 2

OWNERS GUIDE

This guide provides the TECH 15 user with a basic explanation of the
function and operation of the system. The components and controls are
illustrated and discussed. Initial operating procedures and general
operating basics are provided.
Operation and service of the TECH 15's printer is also covered in
detail. In addition, basic troubleshooting and daily service /
maintenance routines are described.

NOTE: For specific command responses and screen displays during
program operation. Consult SECTION 3.

COMPONENTS AND CONTROLS

The TECH 15 is mounted on a sturdy, roll-around cabinet that enables
operation virtually anywhere in the (work)shop. The TECH 15 consists
of the following main components:

1:     The TECH 15 Cabinet which contains:
            A: The CPU bay, (G2-386 computer)
            B: The Printer Drawer, (Epson LQ 850)
            C: The Operating Console, TECH 1 support bracket and
               disk storage drawer.
2:     The Colour Monitor
3:     The Keyboard

Below is a brief description of each component:

1:     The CPU Bay contains a G2-368 computer which is an IBM* AT-
       Compatible 386 processor operating at 25 MHz with 4 MB of memory
       and features a 1.4 MB (High Density) diskette drive, a 140 MB
       Harddisk and a CD-ROM drive. Compact Disks (CD) have a maximum
       storage capacity of 550 MB. The CD drive accommodates CD's. See
       section: OPERATING BASICS.
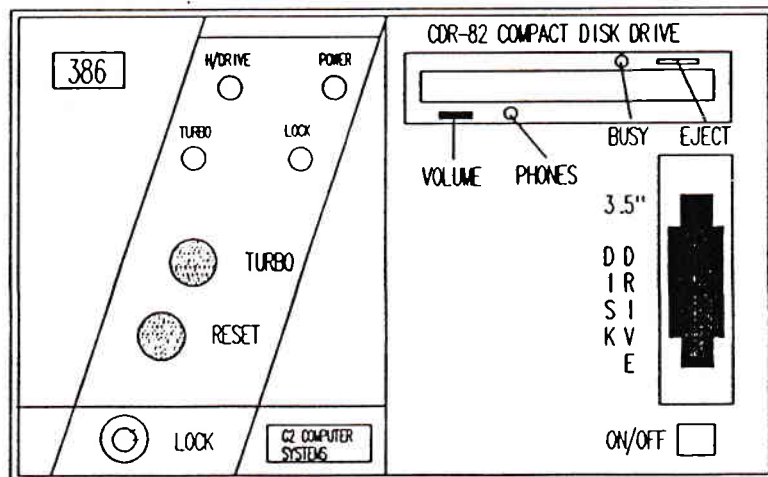
THE G2-386 COMPUTER

B: The TECH 15 dot matrix printer is housed in the printer drawer. Printouts are fed behind the printer and easy to access by opening the drawer. For more details see section: PRINTER OPERATION AND SERVICE.
Located under the printer is a tray to store the paper supply. The paper should be guided along the rear of the tray towards the printer.

C: THE OPERATING CONSOLE
The grey housing on the upper right corner of the TECH 15 contains the mains power switch, the optional volume control, the TECH 1 option (see SECTION 3 for connection details) and the compartment on the right side is used for storage of the CD cassettes, floppy disks and manuals.

The mains on/off switch on the operating console serves as the master power switch which controls all functions of the TECH 15, including the printer.

The optional volume control adjusts the volume of program audible tones.

2:    THE COLOUR MONITOR
The Monitor On/Off switch is located on the front of the monitor. This switch controls the monitor only. This switch should always remain ON. All TECH 15 terminal components can be controlled by the main power switch on the operating console. The Power indicator is located at the front of the monitor.

The Brightness and Contrast controls are located under the cover on the front of the monitor under the screen. These controls adjust the screen to shop lighting conditions. Note the switch settings.
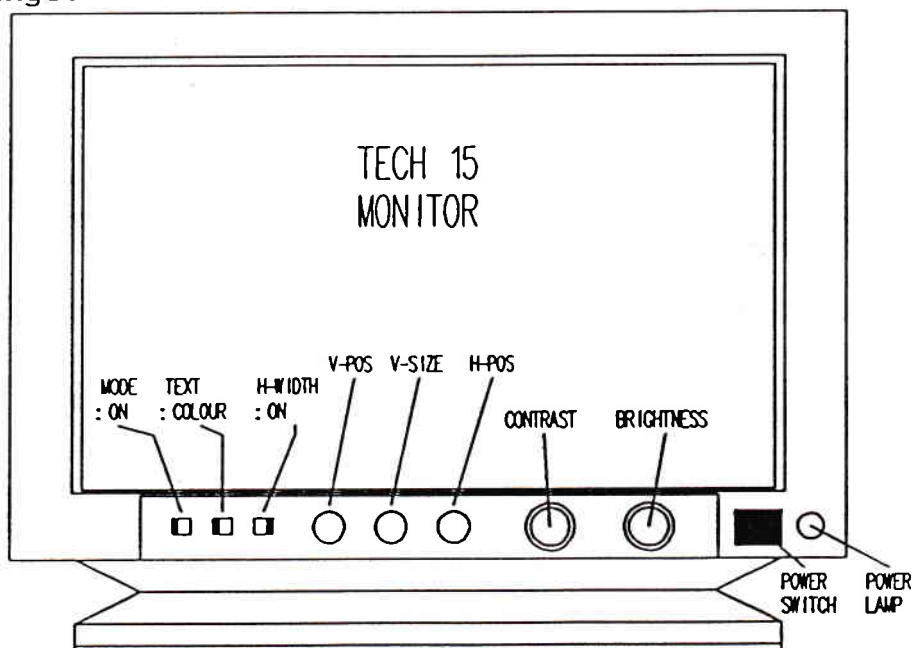

THE TECH 15 COLOUR MONITOR

3:    THE KEYBOARD
      The TECH 15 Keyboard uses as standard a 101 key IBM AT style
      layout with the function keys located along the top. However,
      for different language specifications the number of keys can
      vary. See also section: USING THE KEYBOARD.

      The inlet lead connects the keyboard to the console, DIN
      connector located under the monitor. Make sure this connection
      is secure during operation.
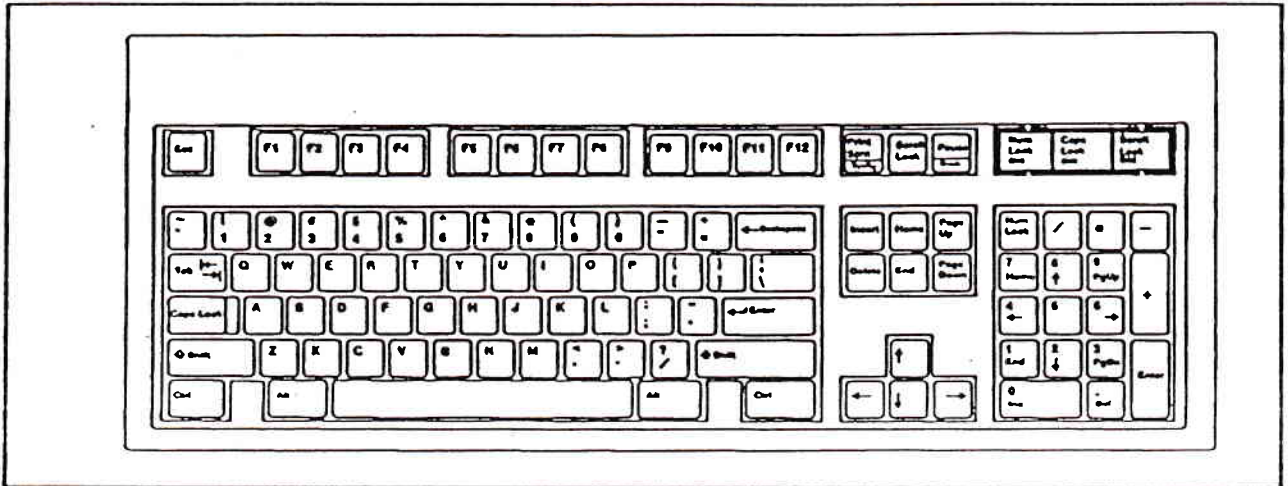
NOTE: The warranty on the keyboard will be invalidated if the
           self adhesive plastic protective cover is removed.

                          THE AIR FILTER

The TECH 15 air filter is located on the rear of the TECH 15 at the
fan area. For filter service see section: MAINTENANCE & SERVICE.

            ****

* COMPATIBILITY

The keyboard is plug compatible with the "IBM PC, XT and AT Personal Computers" and most IBM compatibles. No software modifications or special interfaces are required.

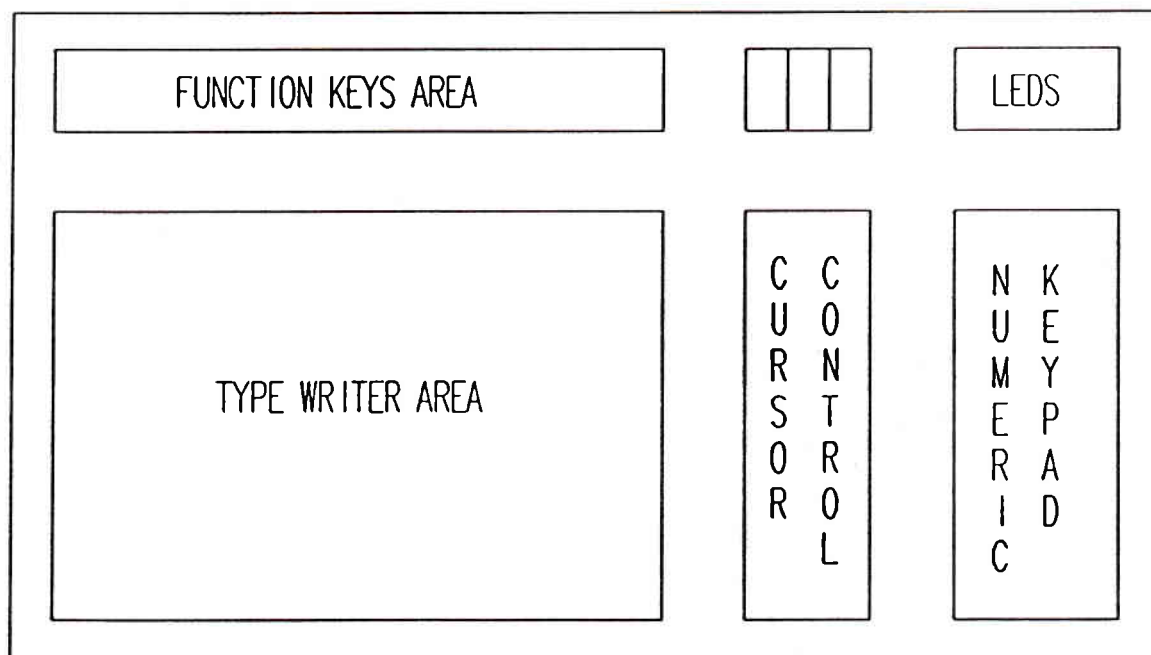## * SEPARATE CURSOR AND NUMERIC KEYPADS

An additional keypad located between the typewriter area and the numeric keypad contains cursor positioning keys, which allows cursor movement while the number keypad is in numerical mode. With separate cursor controls and numerical keypads it is possible to move around a spread sheet page or documents and enter numerical data quickly and accurately.

* KEYBOARD ORGANISATION

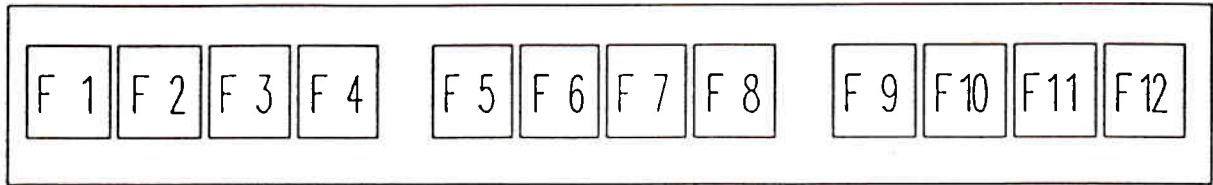The Keyboard is divided into five areas:
- Function Key area (F1 to F12)
- LED Panel (status indicators)
- Numeric Keypad (0 to 9)
- Cursor Control Keypad (arrow keys)
- Typewriter area (alphabetical keys)

A brief description of each area is given on the following pages.

```
+-----------------------------------------------------------------+
|  +-------------------------------+   +-----+   +-----------+     |
|  |      FUNCTION KEYS AREA        |   | | | |   |   LEDS    |     |
|  +-------------------------------+   +-----+   +-----------+     |
|                                                                 |
|  +-------------------------------+   +------+   +----------+     |
|  |                               |   | C  C |   | N   K    |     |
|  |                               |   | U  O |   | U   E    |     |
|  |                               |   | R  N |   | M   Y    |     |
|  |      TYPE WRITER AREA         |   | S  T |   | E   P    |     |
|  |                               |   | O  R |   | R   A    |     |
|  |                               |   | R  O |   | I   D    |     |
|  |                               |   |    L |   | C        |     |
|  +-------------------------------+   +------+   +----------+     |
+-----------------------------------------------------------------+
```

TECH 15 KEYBOARD

* FUNCTION KEY AREA

```
F 1  F 2  F 3  F 4    F 5  F 6  F 7  F 8    F 9  F 10  F 11  F 12
```

The keyboard has twelve multi-purpose FUNCTION KEYS (F1 to F12) located across the top of the keyboard for easy access. The function of each key is defined by the application programme.

In addition, the function key area, also contains the ESCAPE (ESC), PRINT SCREEN (PRINT SCRN), SCROLL LOCK and PAUSE keys. A brief explanation of each of these keys is given below:
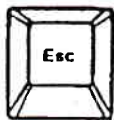
The function of the ESCAPE (ESC) key varies among applications. It is often used to display menus, to exit a function or to cancel a command.

The **PRINT SCREEN** (PRINT SCRN) key is a dual-function key. When this key is pressed alone, the data displayed on the monitor is printed.
An **ALT-PRINT SCRN** combination performs the **SYSTEM REQUIRED** (SYS RQ) function.

NOTE: The **SYSTEM REQUIRED** function is performed only when the keyboard is configured in the "AT" mode. This function is defined by the operating system or application programme.

The function of the **SCROLL LOCK** key varies among applications. Typically, when the SCROLL LOCK is enabled, cursor movement causes the text on the screen to scroll (move) behind the cursor, while the cursor remains stationary. When SCROLL LOCK is disabled, the cursor moves over the text, while the text remains stationary.

NOTE: When the SCROLL LOCK is enabled, the SCROLL LOCK LED is switched on.

The **PAUSE** key is a dual-function key. Pressing the PAUSE key stops the screen listings so that the screen can be read. Pressing any key will resume the listing.
A **CTLR-PAUSE** combination performs the **BREAK FUNCTION**. Break typically is used to cancel the current operation and to terminate the programme.

* THE LED PANEL

The NUM LOCK, CAPS LOCK and SCROLL LOCK LEDS are grouped together, making it easy to see if a key function, CAPS LOCK for example is active. The corresponding led status indicator is activated when NUM LOCK, CAPS LOCK and/or the SCROLL LOCK KEY(s) are pressed. When a LED is illuminated that function is active. When the particular function is no longer desired, press the relevant key. The function will be disabled and the LED will be extinguished.

NOTE: The status of the NUM LOCK LED at power up varies with the model of host computer. CAPS LOCK and SCROLL LOCK functions are disabled at power up, the corresponding LEDs are off.

* THE NUMERIC KEYPAD
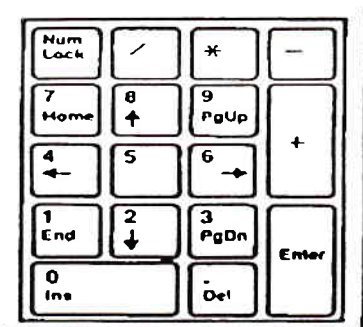
The NUMERIC KEYPAD provides a quick, easy way to enter numeric values while still having a separate cursor control keypad for cursor positioning and edit functions. All four common maths signs "+, -, * and /" are on the Numeric keypad.
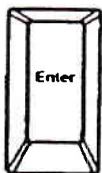
The ENTER key performs the same function as the ENTER Key in the TYPEWRITER AREA. It ends a line of text and positions the cursor at the beginning of the following line. It also performs the "ENTER" function, instructing the computer to perform a specific command or to start a job.

To switch the NUMERIC keypad between the numeric mode and the cursor control mode, use the NUM LOCK key. Depending on the model of the host computer, the numeric keypad maybe placed in the numeric mode on power up or a system RESET / RE-BOOT.

The grey keys "+, -, *, / and ENTER", are active in the numeric mode. In most programmes, they remain active even when NUM LOCK is off.

NOTE: When the NUM LOCK LED is off and the NUMERIC KEYPAD is in cursor control, numbers can still be entered by pressing the SHIFT key and the desired number key.

When the NUMERIC KEYPAD is in cursor control mode, it performs the cursor movement, document control and edit functions marked on the keys.

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* CURSOR CONTROL KEYPAD
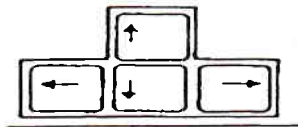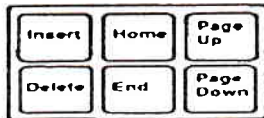
The keyboard features a separate CURSOR CONTROL KEYPAD. This keypad is active during all modes of keyboard operation and is especially convenient when the numeric keypad is in the numeric mode. (NUM LOCK LED is on).

The CURSOR CONTROL KEYPAD contains two groups of keys. The top group are the document control and edit keys: HOME, END, PAGE UP, PAGE DOWN, INSERT and DELETE. The lower group are the cursor movement keys (ARROW KEYS) for positioning the cursor on the screen.

* THE TYPEWRITER AREA
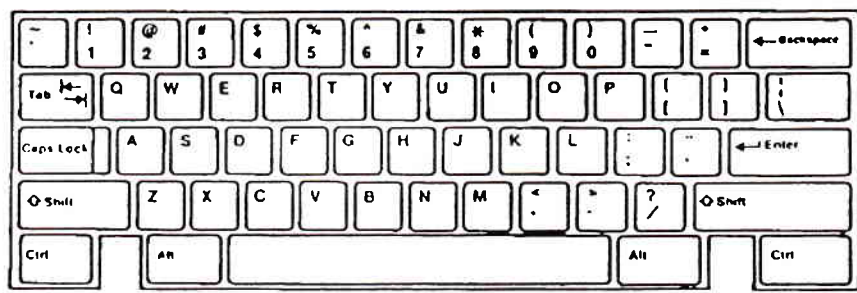
The typewriter area conforms to the industry standard layout and has an ALT key and a CTRL key on either side of the SPACE BAR.

All the white keys in the typewriter area are "TYPE-MATIC", i.e. Repeating as long as the key is held down.

NOTE: ALWAYS USE THE NUMERIC KEYS FOR ONE (1) AND ZERO (0).

The non-character keys located in the typewriter area are described below:
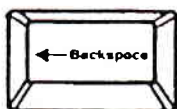
The **BACKSPACE** key is used to delete characters. Pressing backspace key moves the cursor one position to the left, removing that character. The function of the BACKSPACE may vary slightly depending on the application software.
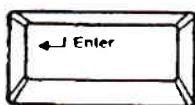
The **ENTER** key normally works like a carriage return, moving the cursor to the start of a new line. The key also performs "ENTER" functions, instructing the computer to perform a specific command or start a job.
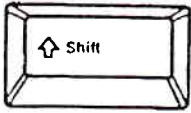
Use either of the two SHIFT keys to enter uppercase letters or to enter the symbol or character shown on the upper position on the keycap. In most application programmes, a SHIFT key can be used together with the numbers when the NUMERIC KEYPAD is in CURSOR CONTROL.
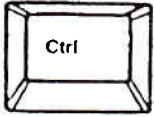
The **CONTROL (CTRL)** key is used with another key or key combinations to perform a command or function. Instructions can be passed to WordPerfect files, e.g. Through CTRL-KEY combinations.
NOTE: To active a CTRL-KEY command, press and hold down the CTRL-KEY first and then press the second key.
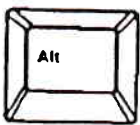
The **ALTERNATE (ALT)** key is used with another key or key combinations to obtain different characters or key functions. e.g. Use the alt key with certain letter keys to enter "BASIC" statement key words quickly.

The **CAPS LOCK** key enables and disables the capital letters function. The CAPS LOCK LED in the LED PANEL indicates whether the CAPS LOCK function is active or inactive. The CAPS LOCK function only affects the letter keys. Use the SHIFT key to type a symbol shown on the upper portion of the other keys.
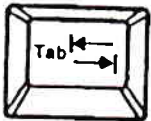
The **TAB** key moves the cursor to the right, to the next tab stop. In some applications, such as DOS, a SHIFT-TAB moves the cursor left to the previous tab setting.

* KEYBOARD HEIGHT ADJUSTMENT
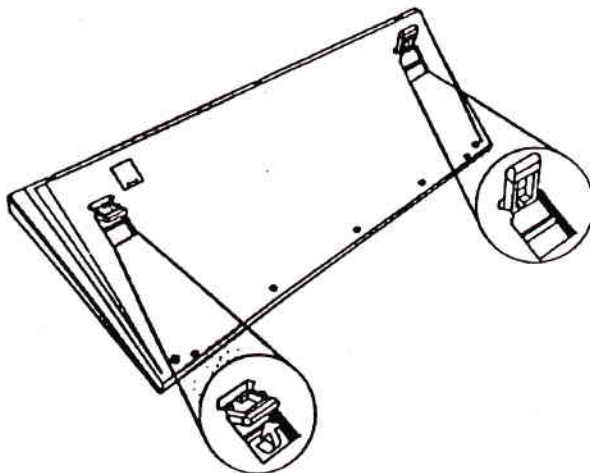
The keyboard can be adjusted to two different positions, level and tilted, by positioning the adjustable legs underneath the keyboard. To tilt the keyboard, simply lift the keyboard legs up, snapping them into their self-locking position as shown above.

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OPERATING BASICS

1.   Plug TECH 15 into a properly-grounded receptacle. Switch on the mains power using the power switch on the operating console. The monitor and the printer power switches should always be on.

2.   Remove the CD from plastic case and place in disk caddy. To open caddy, press on front edges and pull up top panel.

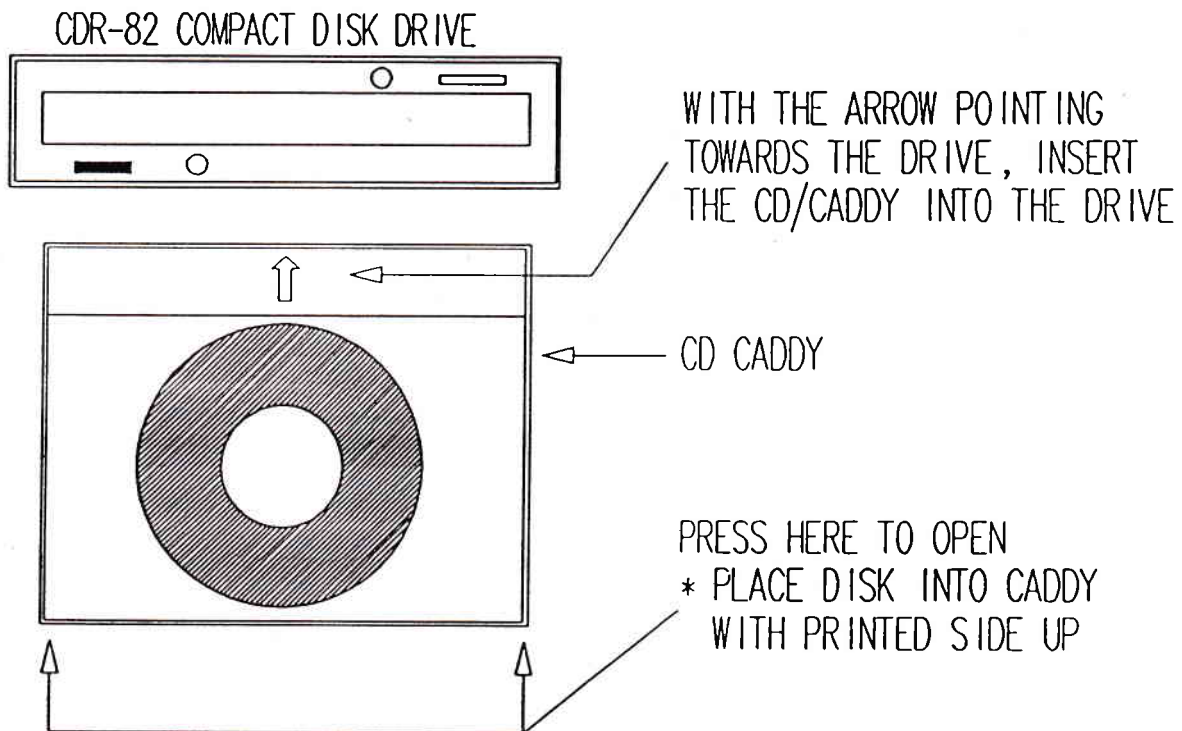When inserting the CD into the caddy, make sure the printed side of the CD faces the transparent cover side of the caddy.

3.   Load CD/CADDY into cd drive. Be sure metal plate is on the bottom of the caddy and arrow is pointing toward the drive.

CDR-82 COMPACT DISK DRIVE

WITH THE ARROW POINTING TOWARDS THE DRIVE, INSERT THE CD/CADDY INTO THE DRIVE

CD CADDY

PRESS HERE TO OPEN
* PLACE DISK INTO CADDY WITH PRINTED SIDE UP

NOTE: DO NOT USE A DAMAGED CD CADDY. IF THE CADDY IS CRACKED OR BROKEN, ITS USE COULD DAMAGE THE CD DRIVE. KEEP THE CD CADDY IN GOOD CONDITION.

Use care when loading and do not force the CD/CADDY into the drive. Gently place the CD/CADDY into the drive applying only slight pressure until the drive retrieves the disk. Applying undue force could damage the drive.

4.   Follow instructions and prompts as presented on the monitor screen. Consult TECH 15 OPERATING INSTRUCTIONS.

NOTE: DO NOT INSERT FINGERS OR OBJECTS INTO EXPOSED DRIVE AREA WHILE PROGRAM IS BEING RUN.

FINAL PROCEDURES

*IF THE PROGRAM RUN WAS THE FINAL PROGRAM OF THE DAY, switch the TECH 15 off using the master ON/OFF switch on the operating console.

*IF A NEW PROGRAM (DISK) IS TO BE RUN, eject old disk. Press and hold drive eject button until the disk begins to eject from the drive. Remove disk and store. Gently insert the "new" disk into the appropriate drive (see preceding procedures) and begin program. Refer to TECH 15 OPERATING INSTRUCTIONS.

Store disks in appropriate storage areas in the TECH 15 cabinet. Remove ejected CD'S from caddy and return to plastic case and store.

****

PRINTER OPERATION AND SERVICE

A. GENERAL

The TECH 15 is equipped with an EPSON LQ 850 printer for producing printed versions of any monitor screen data. The printer is located in a drawer situated under the console.

Standard 8.5" X 11" computer paper is rear-fed into the printer from a paper storage shelf located under the printer.

Replacement ribbon cartridges install easily.

B. PRINTER CONTROLS
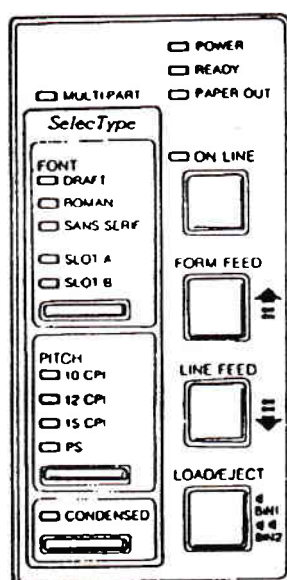
A LOOK AT THE PRINTER
Before proceeding any further, have a look at the control panel.
The lights on the control panel give useful information on what the printer is doing and whether there is a fault. For example:
* ON LINE means the printer is in communication with the computer.
* PAPER OUT means to load some paper.

THE CONTROL PANEL
The control panel on the printer allows control many of the printer's settings just by pressing a button. The control panel has seven buttons and fifteen lights.

THE PRINTER BUTTONS

ON LINE this button switches the printer between ON-LINE and OFF-LINE. When the printer is ON-LINE, the green light above the button comes on and the printer is ready to accept data from the computer. When the printer is OFF-LINE, the light goes out and the printer can no longer accept data from the computer.

The printer has a buffer that stores data from the computer. If the operator stops the computer sending any more data and then turns the printer back ON-LINE, it prints what is stored in the buffer.

When the printer is switched on, it is automatically ON-LINE unless there is no paper in the machine (in which case, it is not possible to get the printer ON-LINE until some paper is installed). If there is a fault in the printer, it goes OFF-LINE automatically, and can only come back ON-LINE when the fault is corrected.

TECH 15   APRIL-91   - 2.11 -

FORM FEED Pressing this button when the printer is OFF-LINE moves the paper up to the next page. If using continuous paper, it moves to the next TOP-OF-PAGE position. This button is also used to control the MICRO-ADJUST feature which is described in the section on "PAPER HANDLING".

LINE FEED Pressing this button when the printer is OFF-LINE moves the paper through the printer by one line. The paper keeps moving until the switch is released. This button is also used to control the MICRO-ADJUST feature as described in the section on "PAPER HANDLING".

LOAD/EJECT Pressing this button loads paper if there is no paper in the printer (or ejects paper if there is). Its operation is described in more detail in the section on "PAPER HANDLING".

THE LIGHTS
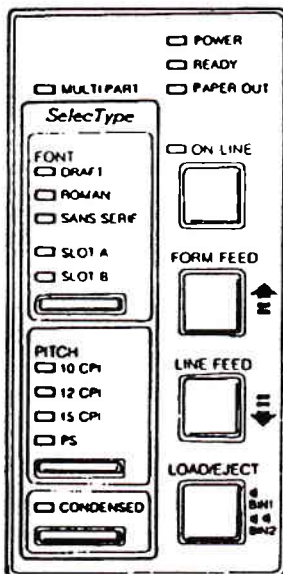
POWER This comes on to show that the printer is connected to the power and is turned on.

READY This comes on when the printer is ON-LINE and there is free space in the buffer (the area of memory that stores information as it arrives from the computer). It normally flickers during printing.

PAPER OUT This comes on when the printer is switched on without any paper in the printer. It also lights when there are characters waiting to be printed and no paper in the printer (the printer also goes OFF-LINE and the BEEPER sounds).

ON LINE This comes on when the printer can receive data.

MULTI-PART This comes on when the paper thickness lever is set to position 4 or higher, or when the MICRO-ADJUST feature is active.

THE BEEPER

The most common heard BEEPER is when the paper has run out. When this happens, three beeps sound.

The BEEPER also sounds if:

* The SELECT TYPE panel is used.
* The MICRO-ADJUST feature is used. (See the "PAPER HANDLING" section).
* The SHORT TEAR-OFF feature is used.

If the beeper sounds at other times, there is probably a fault.

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C. PAPER LOADING

Positioning the continuous paper supply. It is important to keep the paper supply aligned with the paper loaded in the printer, so that the paper feeds smoothly:

* Place the paper underneath the printer on the shelf
* Use the paper stacked behind the printer, keep the printer as far in front of the paper as possible

In all cases make sure that the paper cannot become caught as it is fed into the printer. Make sure that the edges of the paper are always parallel to the direction of feeding.

LOADING CONTINUOUS PAPER:

1. Make sure that the printer is switched off. If the printer has been printing, wait a few minutes for the print head to cool.
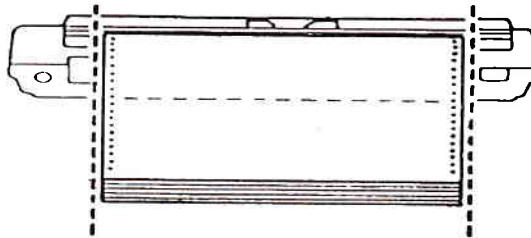
2. Position the paper as described.

3. If loading paper for the first time, remove the printer cover altogether to make it easier to see. With the printer cover off, be careful to keep fingers and other objects such as ties away from the print mechanism to avoid injury or damage.

4. Pull the paper setting lever forward.

The symbol next to the paper setting lever is a reminder that the lever must be forward when using continuous paper.
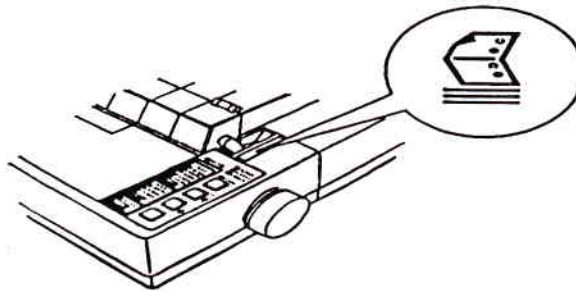
5. Release the sprocket lock levers by pushing the levers forward. Slide the left sprocket unit all the way to the left and lock it in place by pushing the lock lever back.
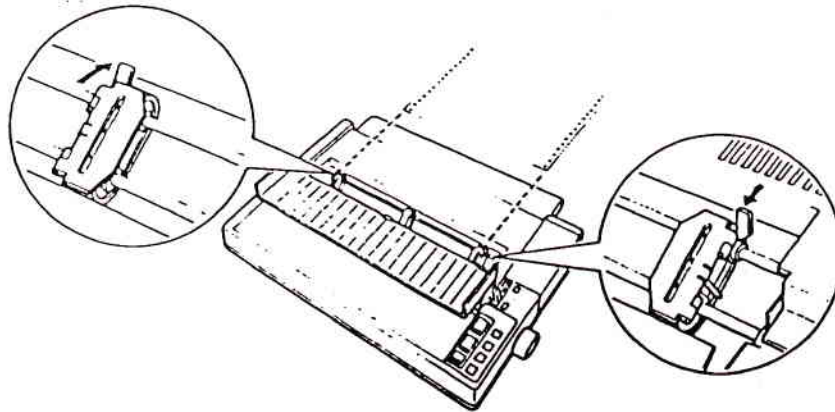
6. Slide the right sprocket unit roughly to match the width of the paper. Do not lock it yet.

7. Slide the paper support to a position midway between the two sprocket units.

8. Open the sprocket covers.
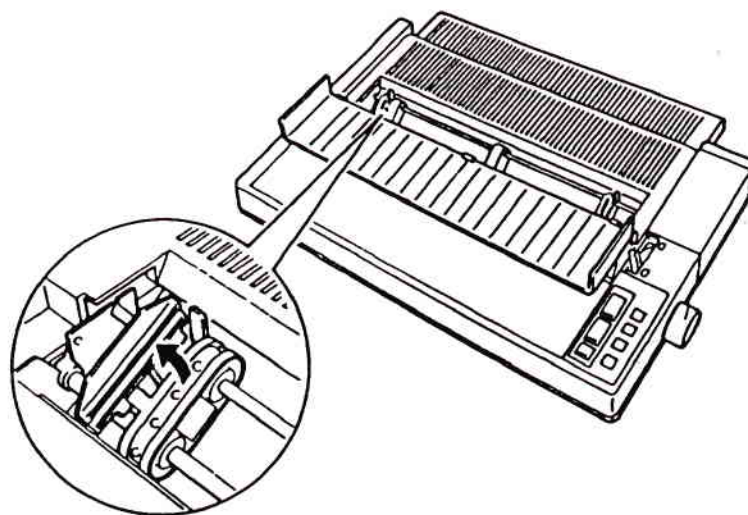
9. Make sure that the first sheet of paper has a clean edge and that the perforated edges are still attached. Fit the first five holes over the pins of each sprocket unit, close the covers. Make sure that the leading edge of the paper is placed just below the metal plate in front of the sprockets. Turn the platen knob slightly to make sure that this happens if necessary. This prevents the edge of the paper catching as it loads.

10. Position the right sprocket so that the paper is tense and has
     no wrinkles; then lock the right sprocket unit in place.

11. Turn on the printer. The **PAPER OUT** light will come on and the
     printer will beep.

12. Press the **LOAD/EJECT** button once to automatically feed the paper
     into the printer.

WARNING:

If the printer cover has been removed the paper bail will be seen to
open and remains open after the paper feeds into the printer.

DO NOT CLOSE THE PAPER BAIL MANUALLY.

It will close automatically when the printer has printed a few lines.

13. Press the **ON LINE** button. At this stage the **ON LINE** lamp will
     light and the **MULTI-PART** lamp will flash. This indicates that
     the **MICRO-ADJUST** feature can be used to alter the TOP-OF-PAGE
     position.

Read the next section on "TOP-OF-PAGE POSITION" for details on how to
use this feature.

WARNING:

Do not advance the paper using the platen knob while the printer is
turned on. If it is required to adjust the position of the paper,
always use the MICRO-ADJUST feature.

TOP-OF-PAGE POSITION

When paper is loaded into the printer it is important that printing
begins at the correct position at the top of each new page and ends
at the correct position at the bottom of each page. After the
continuous paper has been loaded, the position at which the printer
begins printing can be adjusted. This is called "SETTING THE
TOP-OF-PAGE POSITION". To adjust the TOP-OF-PAGE POSITION use the
MICRO-ADJUST feature.

WARNING:

Never use the platen knob for paper feeding except in cases of paper
feeding problems. Always use the MICRO-ADJUST feature to adjust the
TOP-OF-PAGE POSITION.

MICRO ADJUSTMENT

The MICRO-ADJUST feature moves the paper 1/180 inch at a time to make fine adjustments to the TOP-OF-PAGE POSITION. Once the MICRO ADJUSTMENT has been used, the printer will always load paper to the same position set with this feature. The TOP-OF-PAGE POSITION is remembered by the printer when it is switched off.

NOTE:

A standard TOP-OF-PAGE POSITION is normally set. If the position is changed for printing a special document, remember to reset it to the normal setting before switching off. If this is not done the standard documents will printed in the wrong position because the current TOP-OF-PAGE POSITION is always saved.

To use MICRO ADJUSTMENT first load the paper and then press the **ON LINE** button to set the printer ON-LINE. At this stage the **MULTI-PART** lamp will flash to indicate that the MICRO-ADJUST feature is active.

Now press the **FORM FEED** button to feed the paper forwards or the **LINE FEED** button to feed the paper backwards.
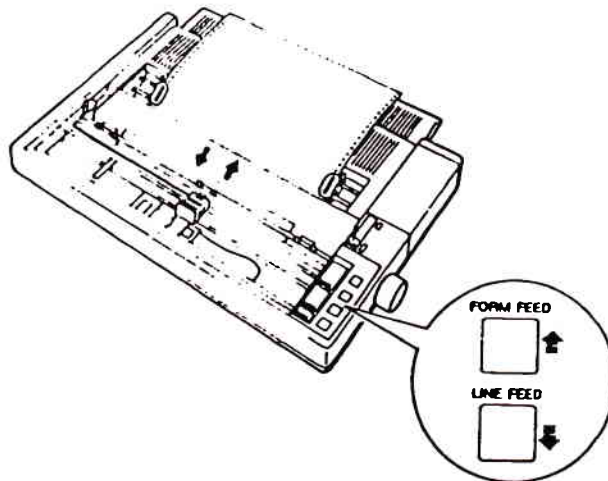
Each time that either button is pressed the paper moves 1/180 inch. If either button is held down the paper moves continuously in 1/180 inch steps.

The printer has a built-in default position for the TOP-OF-PAGE setting. If the position of the paper is moved past this setting when using MICRO ADJUSTMENT, the printer will beep and pause momentarily.

For most printing purposes this is default position satisfactory. If the TOP-OF-PAGE position is moved too far backwards or forwards the printer will beep and the MICRO-ADJUST feature will not function.

When the TOP-OF-PAGE position has been set continue printing in the normal way. The printer will automatically load each new sheet of continuous paper to the new position that has been set.

RIBBON CARTRIDGE REPLACEMENT

REPLACING THE RIBBON

When printouts become too faint, the ribbon cartridge will need to be replaced.

WARNINGS:

A: DO NOT USE ANY OTHER RIBBON TYPE THAN THE ORIGINAL SUN / EPSON LQ PRINTER RIBBON. THE GENUINE PRODUCT MIGHT SEEM MORE EXPENSIVE, BUT SINCE THE ORIGINAL PRODUCT IS MANUFACTURED UNDER THE HIGHEST QUALITY CONTROL THIS ENSURES THE BEST GUARANTEE FOR A SMOOTH PRINTOUT AND ALSO MINIMUM OF WEAR OF THE PRINTHEAD. THEREFORE THE SERVICE COST IS LOWER, USING THE ORIGINAL SUN / EPSON PRODUCT.

IF ANY ANOTHER RIBBON TYPE IS USED SUN DOES NOT REPAIR A PRINTER UNDER WARRANTY.

B: If using the optional film ribbon, the print quality will get faint abruptly and the ribbon may snap, if it is used beyond the normal life expectancy. Also, make sure that it is stored at normal temperature - too high temperature will shorten the life expectancy.

To replace the ribbon, grip the cartridge by the fin at the top. Lift the ribbon out. Install a new ribbon in following manner:

INSTALLING THE NEW RIBBON

1.   **Check that the printer is not switched on.**

2.   **Take off the printer cover.**

3.   **Push the paper bail lever backwards.**

WARNING:

The power must be off when moving the print head, otherwise damage can be caused to the printer mechanism. If the printer has been used just before changing the ribbon, allow the print head to cool before removing the old ribbon.

4.   **Move the print head to the centre position on the paper bail.**

5. Tighten up the ribbon by turning the feed knob in the direction
    of the arrow marked on the cartridge, this will make it easier
    to insert it into the printer.
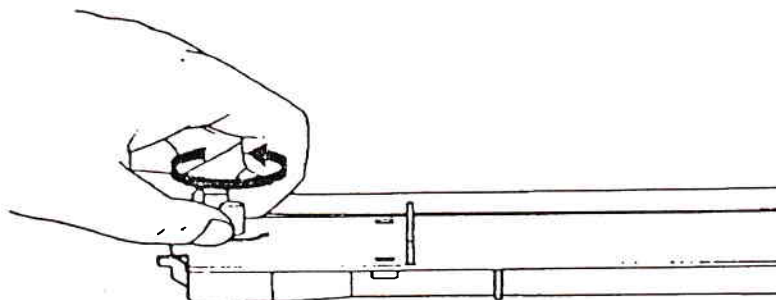
6. Hold the cartridge by its black, fin-like handles. (The LQ-850
    ribbon cartridge has only one handle in the centre of the
    cartridge.)

7. Fix the cartridge in position by placing the socket on the
    underside of the cartridge over the locating pin on the left
    side of the printer. Push the cartridge down firmly until it
    clicks into position. Make sure that the black plastic hooks at
    each end of the cartridge fit into the slots inside the printer.
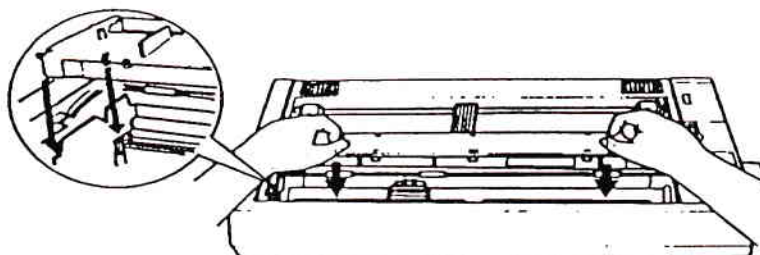
8. Use a pointed object (such as the tip of a pencil) to guide the
    ribbon between the print head and the ribbon guide. At the same
    time turn the ribbon-tightening knob in the direction of the
    arrow to help feed the ribbon in place.
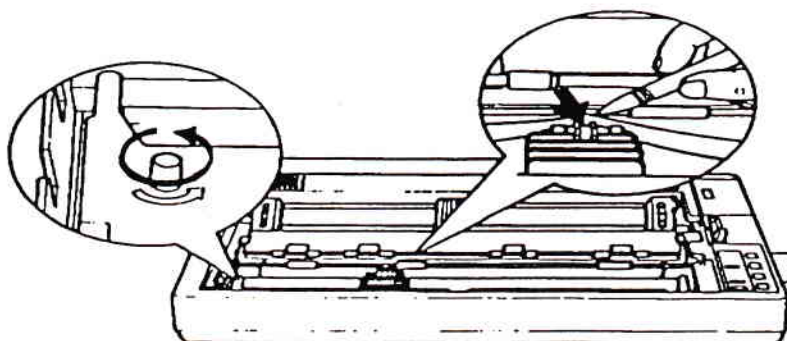
9. Check the ribbon is tight by turning the feed knob
    anti-clockwise.

BASIC TROUBLESHOOTING

HOW TO SOLVE PROBLEMS

This section explains what can be done if problems arise with the printer. It may not give the absolute answer, but should at least point the operator in the right direction.

If a problem arises, it may not be as disastrous as it first appears. Try to remember what happened. Work through the steps logically, re-reading the appropriate part of the guide or software manual if necessary. Write down what happens when it is tried the second time.

Persist; it is possible that the wrong key on the computer was pressed without realising it.

Although it might seem obvious, read the guides - not just this one, but the software ones as well.

Do not assume that, if an epson dot matrix printer has been used before, that LQ printers work in exactly the same way. They handle paper in a very sophisticated way and time is needed to get used to this.

GENERAL HINTS

If difficulties are encountered, go through the steps below.

1.   If trying to use SELECT TYPE, read the section on "SELECT TYPE".

2.   If the beeper is sounding, look at the section immediately after these general hints.

3.   If there is no beeper sound, read the appropriate part of the guide. For example, if having difficulties loading paper, go back to the section on "PAPER HANDLING" in this guide. Make sure that each step is followed exactly.

4.   If the problem has still not been solved, look down the subsequent headings. If a heading is found that matches the symptom, follow the instructions there. If the heading does not match the problem, look in other sections for similar problems.

5.   Finally, if still having difficulties, contact the Sun dealer.

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SELECT TYPE PROBLEMS

The use of SELECT TYPE makes control of printing easier.

SELECT TYPE SETTINGS DO NOT WORK

If printing a document having made a number of settings with SELECT
TYPE and they are ignored, it is probable that the software is
sending commands to the printer. It is possible to find out which
codes it is sending to alter the printing by using the hex dump mode.

The programme may be sending an initialization sequence; this is a
set of codes it sends before printing a document. It may possible to
alter the sequence: look in the software manual in the section on
installing the software (may be called set-up, install, printer
control, or printer driver) to find out if there is such an
initialization option which can be change to avoid the problem.

BEEPER ERROR WARNINGS

The printer is fitted with a beeper that sounds when the it has found
an error. This usually indicates that the printer is out of paper.
The beeper can also be sounded by any program that sends ASII code
BEL, and by certain error conditions in the printer itself.

BEEPER SOUNDS THREE TIMES AND PRINTER STOPS

This is how the printer indicates that it has run out of paper.
If the paper is loaded, then the printer is indicating that its paper
out sensor is not covered properly. Turn the printer off and reload
the paper correctly. Turn the printer back on and try to print again.
If the printer still gives three beeps and fails to print, consult
the Sun dealer.

BEEPER SOUNDS FIVE TIMES AND PRINTER STOPS

If the printer beeps five times, there is a problem with the print
head and ribbon carriage. Turn the printer off. Check that the ribbon
is correctly positioned and that there are no obstructions inside it,
then turn the printer on again. If the printer does not come on
normally, refer the problem to the Sun dealer.

BEEPER SOUNDS WHEN PRINTER IS TURNED ON

If the printer beeps when the printer is turned on, switch the
printer off, remove the interface cable and switch on again. If the
problem occurs only when the interface cable is plugged in but not
when it is removed, the cable may be incorrectly wired. Check the
wiring, especially the ground connections. If the problem is still
there when the cable has been removed, consult the Sun dealer.

RIBBON

The ribbon may need to be replaced when it has been in use for a long time or for a large amount of printing. Check that the ribbon is seated correctly and that the pins at either side are properly located in the holes in the ribbon cartridge.

If the printer has not been used for some months, the ink on the part of the ribbon exposed to the air may have dried out. The rest of the ribbon will probably be satisfactory, and the dry patch will be slightly re-inked once it has fed back into the cartridge. If the quality of the printout is unacceptable, replace the ribbon.

If using the optional film ribbon, the printing will suddenly become faint when the ribbon reaches the end of its life. The ribbon may also snap. To get the best out of a film ribbon never store it at higher temperature than normal.

PRINT HEAD

It is possible for parts of the print head to wear out if the printer is used a lot and for long periods at a time. Some symptoms of one or more of the print-head pins failing to fire are:

* A white horizontal gap along each line of the printout

* Letters such as g, p and y being printed without their descenders, or letters being printed without their ascenders (e.g.: t, h and l)

* Some dots printed darker than others (one or more pins have started to stick).

Similar symptoms can appear on a printer that is used very infrequently. In this case, the problem is the pins sticking rather than being worn out. Never spray oil into the print head, as this can make the problem worse.

Contact the Sun dealer who will be able to fit a replacement print head and check other parts of the printer at the same time.

PAPER

If contented that the print head is working properly, then check the paper thickness lever. The position of the print head (which can be adjusted for paper thicknesses) may be wrong. Also check that the surface of the paper in use is clean and not waxy or greasy.

Read the section on "PAPER HANDLING" in this guide for information on the paper thickness lever and the best type of paper to use with the printer.

SECTION 3

OPERATING INSTRUCTIONS

TECH 15 APRIL-91

SECTION 3

OPERATING INSTRUCTIONS

SYSTEM OVERVIEW

The OPEL/VAUXHALL TECH 15 is a microcomputer-based, technical service information system that allows quick and easy retrieval of service information. The system is designed to assist technicians in servicing/repairing vehicles the first time.

The TECH 15 database will be continuously updated over the coming months.

The TECH 1 SCAN TOOL is able to download data to the TECH 15 for further analysis.

The TECH 15 currently displays information in one of four languages; English, German, French or Swedish. Additional languages will be supported in the future.

INSTALLATION

The TECH 15 system is contained on one CD-ROM (COMPACT DISK - READ ONLY MEMORY) which will be mailed on a scheduled basis. Each CD-ROM has the capacity of storing several hundred million characters of information.

Each CD-ROM received must be installed on the TECH 15 as follows:

1. Place the CD-ROM (label side up) into its caddy and insert into the CD-ROM drive.

2. Press the reset button located on the PC. The TECH 15 automatically installs the CD-ROM. Installation is complete when the TECH 15 LOGO screen appears on the monitor.

3. Press any key to display the TECH 15 SYSTEM MENU screen.

After the initial system installation, choose the system set-up option from the TECH 15 *SYSTEM MENU*. This will allow the operator to select the language in which the system will operate and the vehicle make.

NOTE: Before continuing, read the system OPERATING CONVENTIONS material in this guide to learn some basic information on **operating the system.**

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┌─────────────────────────────────────────────────────────────┐
①→│              SERVICE INFORMATION SEARCH CRITERIA              │
  │  ─────────────────────────────────────────────────────────  │
②→│ ┌──────────────────┐                                         │
  │ │Service Information│                                         │
  │ ├──────────────────┴────────────┐                            │
  │ │  Select One                   │                            │
  │ │  ┌─────────────────────┐ ┌──┐ │                            │
  │ │  │ • Technical Remedies │ │ ▲│ │                            │
  │ │  └─────────────────────┘ │▓▓│ │                            │
  │ │    Standard Information   │ ▼│ │                            │
  │ │                          └──┘ │                            │
  │ └───────────────────────────────┘                            │
  │                                                              │
  │   Search Path                                                │
  │   Technical Remedies          Standard Information           │
  │   Complaints:                 Applications:                  │
  │   Groups:                     Groups:                        │
③→│  Opel 1987 Senator 30 NE 4 Sp Automatic                      │
④→│  F1-Help     F3- Search   F5-Clear Window   F9-Exit Previous   F10-Exit Main │
└─────────────────────────────────────────────────────────────┘
```
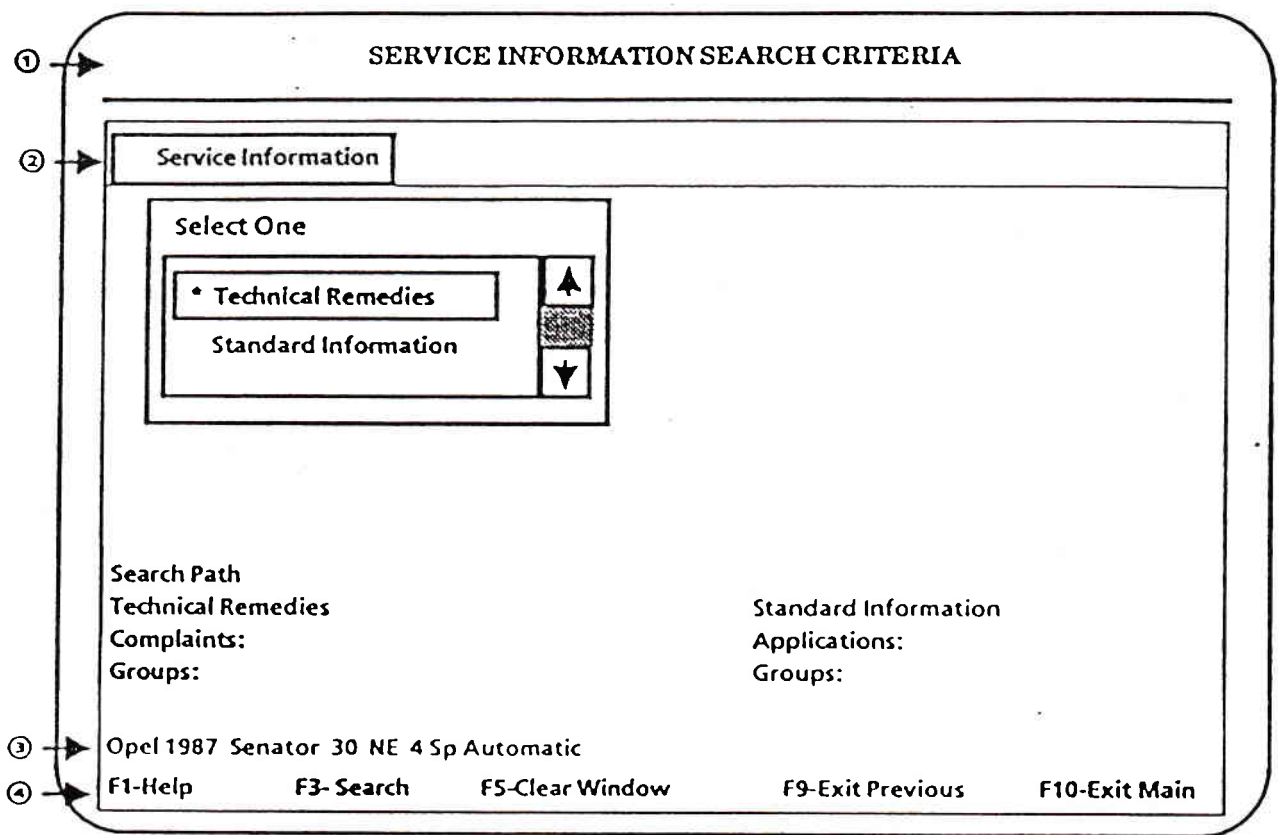
SCREEN DISPLAY CONVENTIONS
Each screen in the TECH 15 system consists of the following common elements.

1: TITLE LINE
Displays the title of the screen. It is the first line of every screen.

2: MENU LINE
Displays the options available on that screen. It is the second line of every screen.

3: VEHICLE LINE
Displays the vehicle currently defined to the system. It appears just above the function key line on certain screens.

4: FUNCTION KEY LINE
Displays the function key assignments for that screen. It is always the last line on the screen.

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SYSTEM OPERATING CONVENTIONS

To use the TECH 15 *SERVICE INFORMATION AND DIAGNOSTIC SYSTEM,* the operator must learn several common operating conventions. These include:

MENU LINE
Displays the options available with each screen. Most activities are initiated from the menu line. The menu line is always the second line on every screen.

HIGHLIGHT BAR
Used to indicate the position on the screen and to identify to the system the choice of menu line option or window selections. The highlight may be moved using the cursor keys or the mouse.

WINDOW
A rectangular box that displays the available options or selections.
An asterisk (*) is used to identify the selected item(s).
A minus sign (-) is used to indicate item(s) for which no data exists. These items can not be selected.

EXIT OPTIONS
The *EXIT* options allow the operator to move backward from one screen to another. The function key line at the bottom of the screen identifies the applicable exit options.

HELP
The TECH 15 system displays unique help information for each screen whenever the <F1> key is pressed. The *HELP* function will be expanded in future CD-ROM releases.

THE KEYBOARD

<ESC>
Returns to the previous window or to the top menu line if there is no previous window.

<ENTER>
Selects the highlighted item.

<SPACE>
Sets the print flags on the *SERVICE INFORMATION LIST* screen.

FUNCTION KEYS

<F1>
Displays the *HELP* information applicable to that screen.

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<F3>
Initiates an action specific to the current screen. For example, <F3> is used to accept the vehicle on the *VEHICLE SELECTION* screen, or to initiate the document search process from the *SERVICE INFORMATION SEARCH CRITERIA* screen.

<F5>
Clears selected items on some screens. Returns figure to original size from the *SERVICE INFORMATION FIGURE DISPLAY* screen.

<F7>
Cancels print request.

<F9>
Exits to the previous menu. Exits to the *PRODUCT EVALUATION REPORT PROGRAM* from the *MAIN MENU*.

<F10>
Exits to the *MAIN MENU*. Exits to the *SYSTEM MENU* from the *MAIN MENU* and the *SET-UP MENU*.

CURSOR CONTROL KEYS
The cursor control keys allow the operator to move the highlight bar within a window or on the menu line.

ARROW KEYS
Moves the highlight bar in any of the four directions.

<PGUP> <PGDN>
Moves the information up or down within the window.
Moves up or down one screen page of text.

<HOME> <END>
Moves the highlight bar to the beginning or end of the window.
Moves to the beginning or end of a document.


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TECH 1 DIAGNOSTIC TOOL

The TECH 1 is a hand held diagnostic computer designed specifically as a tool to help the operator diagnose and repair electronic systems used on "GENERAL MOTORS" vehicles.

Using plug-in program cartridges, it can be adapted to operate with virtually all electronic systems used on "GM" vehicles ranging from the simplest to the most complicated.

The TECH 1 is powered from the vehicle and communicates to the vehicle computer system via the "ASSEMBLY LINE DIAGNOSTIC LINK" (ALDL) connector. When the TECH 1 is connected to this connector on the vehicle it can perform a number of tasks depending on which cartridge is used:

- READING AND STORAGE OF TROUBLE CODES
- READING AND STORAGE OF DIAGNOSTIC DATA
- CAN TAKE CONTROL OF THE ENGINE FOR AUTOMATIC TESTS
- DOWN LOAD "SNAPSHOT" STORED DATA TO THE TECH 15

TECH 1 POWER SUPPLY

TECH 1 power is supplied from the TECH 15 / TECH 1 support unit.

The support unit contains a 10 pin Packard Electric OPEL "ALDL CONNECTOR" and two DB-9 serial port connectors "COM 1" and "COM 2". The DB-9 connectors are for future expansion.

Connect "ALDL" lead to the support unit "ALDL" connector.

DATA COMMUNICATIONS LINK

The TECH 1 *DATA COMMUNICATIONS LINK* function, available under the "DIAGNOSTICS" option on the MAIN MENU. This allows the transmission or the down loading of "SNAPSHOT" data from the TECH 1 to the TECH 15 from further analysis.

A typical "SNAPSHOT" consists of a series of consecutive samples of the vehicles "ALDL" data stream, with each sample containing all valid data parameters.

TECH 1 DATA COMMUNICATIONS LINK SCREEN

Selecting the TECH 1 DATA COMMUNICATIONS LINK option from the MAIN MENU displays the TECH 1 DATA COMMUNICATIONS LINK screen that provides the following menu options: RECEIVE SNAPSHOT, DATA ANALYSIS and FILE MAINTENANCE.

RECEIVE SNAPSHOT

The *RECEIVE SNAPSHOT* option allows the operator to store snapshot data on the TECH 15. Pressing <ENTER> with the highlighted bar on the *RECEIVE SNAPSHOT* opens a window with the prompt "FILENAME". A name must be assigned to each "SNAPSHOT" before it can be stored on the TECH 15. As a suggestion, use the work order number as a filename.

Type the name and press <ENTER>. Once the "SNAPSHOT" has been received, the prompt "PRESS <F3> TO DISPLAY SNAPSHOT" is displayed.

The system will prompt the operator if a filename that has already been assigned is entered. At this point the operator has the option to delete the old file or entering a different filename.

The TECH 15 is capable of storing a maximum of 255 snapshot files. Once this limit is reached, it will be necessary to delete snapshot files that are no longer required. Instructions for deleting obsolete snapshot files are provided under the file maintenance option.

DATA ANALYSIS

The *DATA ANALYSIS* option allows the operator to select one of the "SNAPSHOT" files for analysis. Move the highlighted bar to the *DATA ANALYSIS* option and press <ENTER> to open a window with a list of the files stored on the system. Next to each filename is the date and time that the file was created.

Use the up and down arrow keys to position the highlighted bar on the file to be analysed. Pressing <ENTER> selects the file for analysis and updates the "SNAPSHOT" description show just above the function keys. Pressing <F3> "DISPLAY SNAPSHOT" automatically displays the *TECH 1 DATA ANALYSIS* screen.

FILE MAINTENANCE

Since the storage is limited to a maximum of 255 snapshot files, sooner or later it will be necessary to delete one or more obsolete files. The *FILE MAINTENANCE* option allows the operator to delete files that are no loner required. There are two options under the *FILE MAINTENANCE* option: DELETE SELECTED FILES and DELETE ALL FILES.

DELETE SELECTED FILES allows the operator to delete one or more selected files. Move the highlighted bar to each file to be deleted and press <ENTER>. Files selected for deletion are identified with an asterisk (*). Pressing <F3> deletes the selected files.

DELETE ALL FILES allow the operator to delete all snapshot files stored in the TECH 15. Selecting the *DELETE ALL FILES* causes the system to prompt the operator to confirm if all files are to be deleted. Press <TAB> to the "YES" box and press <ENTER> to delete all files.

THE FUNCTION KEYS:

Listed below is a description of the function keys used in the TECH
1 DATA COMMUNICATIONS function.

<F1>: HELP

Press <F1> to display a list of keys active on the TECH 1 "DATA
COMMUNICATION LINK" screen.

<F3>: DISPLAY SNAPSHOT / DELETE FILES

Press <F3> to display the parameters associated with the selected
snapshot file, when either the snapshot or data analysis menu option
is active.

Press <F3> when the MAINTENANCE MENU line is active.

<F5>: CLEAR

Press <F5> to clear files selected for deletion in the delete
selected files multiple selection window.

<F9>: EXIT PREVIOUS

Press <F9> to return to the previous displayed screen.

<F10>: EXIT MAIN

Press <F10> to return to the SERVICE INFORMATION and DIAGNOSTIC
SYSTEM or MAIN MENU.

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TECH 1 DATA ANALYSIS

The TECH 1 *DATA ANALYSIS* screen allow the operator to view the entire list of parameters, with any stored trouble codes, for every sample within a snapshot file. For most ELECTRONIC CONTROL UNITS (ECU'S), the entire list can be displayed on the screen.

The TECH 1 DATA ANALYSIS function is entered by pressing <F3> "DISPLAY SNAPSHOT" after a file has been received or after a file has been selected using the "DATA ANALYSIS" option on the TECH 1 "DATA COMMUNICATIONS LINK" screen. Selecting a file for analysis replaces the vehicle currently defined in the TECH 15 system with the vehicle information contained in the snapshot data.

When first displayed, the current sample is 0, the trigger sample and the highlighted bar is on the *SELECT PARAMETER* option. Press <PGUP> or <PGDN> to move backward and forward one sample at-a-time. Press <HOME> to move to the first sample, press <END> to move to the last sample. Press <F5> to return to the TRIGGER SAMPLE.

SELECT PARAMETERS OPTION

Allows the operator to highlight individual parameters within a snapshot file.

Highlighted parameters may be plotted or used to draw an "EYE" as each sample page is selected. After pressing <ENTER> with the highlighted bar on the *select parameters* option, the arrow keys can be used to position the highlight bar. To select a parameter, press <ENTER> with the highlight bar on that parameter.

Pressing <F5> clears all highlighted parameters.

SAMPLE NUMBER OPTION

Allows the operator to display a particular sample by entering its sample number.

SERVICE INFORMATION OPTION

Selecting this option displays the service information criteria screen that allows the search for service or diagnostic related information that may help with the analysis of the snapshot data.

PLOT FUNCTION

A maximum of four parameters may be selected for plotting at one time. Pressing <F3> "START PLOT" with one of the four parameters highlighted automatically displays a plot of those parameters on the TECH 1 GRAPHICAL ANALYSIS screen. The TECH 15 system will prompt the operator whenever more than four parameters are selected.

THE PRINT FUNCTION

Press <F4> to print a copy of the screen.

TECH 1 GRAPHICAL ANALYSIS

The TECH 1 *GRAPHICAL ANALYSIS* screen displays a graph of up to four "ALDL" parameters selected from the TECH 1 *DATA ANALYSIS* screen. For the initial plot, the endpoints of the "X-AXIS" are the first and last sample numbers taken from the snapshot file. The plot is centred at the trigger or zero sample. The "Y-AXIS" is established by the minimum and maximum values recorded for a parameter during the snapshot, with the exception of the following parameters:

PARAMETER NAME	Y-MIN	Y-MAX
MANIFOLD ABSOLUTE PRESSURE	0 VOLTS	5.1 VOLTS
MANIFOLD VACUUM	0 VOLTS	5.1 VOLTS
THROTTLE POSITION SENSOR	0 VOLTS	5.1 VOLTS
BAROMETRIC PRESSURE	0 VOLTS	5.1 VOLTS
BATTERY VOLTAGE	0 VOLTS	25.5 VOLTS
FUEL PUMP VOLTAGE	0 VOLTS	25.5 VOLTS

To move through the snapshot file use the following keys:

The left and right arrow keys to move up and down one sample at a time.

<HOME>, <END> to move to the first or last sample within a snapshot file.

<PGUP>, <PGDN> to move up or down 5 samples at a time.

To return to the trigger or zero sample, press <5> on the numeric keypad.

SAMPLE LIMITS (X) OPTION

The sample limits (X) option allows the operator to vary the "X-AXIS" by changing the endpoints of the plot. Selecting the *SAMPLE LIMITS (X)* option opens a data entry window with the prompt "SAMPLE FROM" and the current endpoint sample. Enter a new "SAMPLE FROM" number or press <ENTER> to accept the current endpoint. The system then prompts "SAMPLE TO" value, enter new "SAMPLE TO" or press <ENTER> to accept the current endpoint.

The system will automatically display a plot using the new sample limits.

PARAMETER LIMITS (Y) OPTION

The parameter limits (Y) option allows the operator to alter the "Y-AXIS" by changing the minimum and maximum limits for one or more parameters.

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Selecting the *PARAMETER LIMITS (Y)* option opens a window that lists the parameters currently plotted. Move the highlighted bar to the first parameter to be changed and press <ENTER>. The system displays a data entry window with the prompt "MINIMUM LIMIT" and the current minimum for the selected parameter. The operator can enter a new minimum limit or press <ENTER> to accept the current minimum limit.

The system then prompts the operator to enter a new maximum limit. Once again a new maximum limit may be entered or press <ENTER> to accept the current maximum limit.

Press <F3> "START PLOT" to display a plot based on the new parameter limits.

To return to the initial Y-MIN / Y-MAX values press the <F5> "RESET" key.

SELECT PARAMETER OPTION

The select parameter option allows the operator to change one or more of the plotted parameters. Move the highlighted bar to the *SELECT PARAMETERS* option and pressing <ENTER> opens a window with a list of all parameters applicable to the snapshot file. Parameters included in the current plot are identified with an asterisk (*). If the current plot already contains four parameters, the operator must first de-select a parameter before selecting another or press <F5> to clear all plotted parameters.

Press <F3> "START PLOT" to display a plot of the new parameters.

PRINT FUNCTION

Press <F4> to print a copy of the plot as it appears on the screen, press <F7> to cancel the print request.

THE FUNCTION KEYS:

Listed below is a description of the function keys used in the TECH 1 GRAPHICAL ANALYSIS screen.

<F1>: HELP

Press <F1> to display a list of keys active on the TECH 1 "GRAPHICAL ANALYSIS" screen.
Press <F1> again to display the TECH 1 GRAPHICAL ANALYSIS part of the operator's manual.

<F3>: START PLOT

Press <F3> to display a new plot after changing either a parameter limit or a parameter.

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<F4>: PRINT PLOT

Press <F4> to print a copy of the plot as it exists on the screen.

<F5>: RESET/CLEAR

The <F5> key has two functions; RESET and CLEAR.

With no window open, the <F5> key is labelled "RESET". Pressing <F5> RESET, returns the selected parameters to their original minimum and maximum values. The sample limits are not affected.

With the select parameters window open, the <F5> key is labelled "CLEAR". Pressing <F5> CLEAR, clears all selected parameters.

<F7>: CANCEL PRINT

Press <F7> to cancel a print request.

<F9>: EXIT PREVIOUS

Press <F9> to return to the previous displayed screen.
In this case the "TECH 1 DATA ANALYSIS" screen.

<F10>: EXIT MAIN

Press <F10> to return to the SERVICE INFORMATION AND DIAGNOSTIC SYSTEM or MAIN MENU.

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SECTION 4

MAINTENANCE AND SERVICE

TECH 15 APRIL-91

SECTION 4

INTRODUCTION

The SUN TECH 15 is a precision diagnostic system that requires little care. The maintenance and service procedure presented in this section are those which the operator can perform. All other service should be performed by an authorised SUN ELECTRIC REPRESENTATIVE.

If a problem arises, it may not be as disastrous as it first appears. Try to remember what happened. Work through the steps logically, re-reading the appropriate part of the guide or software manual if necessary. Write down what happens when it is tried the second time.

Persist; it is possible that the wrong key on the computer was pressed without realising it.

Although it might seem obvious, read the guides - not just this one, but the software ones as well.

Do not assume that, if an epson dot matrix printer has been used before, that LQ printers work in exactly the same way. They handle paper in a very sophisticated way and time is needed to get used to this.

OPERATING CONDITIONS

Make sure to work in a well-ventilated area. The TECH 15 components (drives, monitor, printer, etc.) Operate best in ambient temperatures between 10°C (50°F) and 40°C (104°F). Allow sufficient warm-up time.

DO NOT MOVE THE TECH 15 AROUND WHILE THE UNIT IS IN OPERATION, DISK ACCESS DURING MOVEMENT OF THE UNIT MIGHT CAUSE SERIOUS DAMAGE TO THE DISK AND THE DATA STORED ON DISK.

MAINS POWER

If no power is present to a specific component of the TECH 15, check that the connectors are tight and that the specific power switches are on the ON position. On some components the mains power indicators will be seen.

BASIC TROUBLESHOOTING

* THE MONITOR

If the screen is totally dark, check the power indicator lights up, if not turn the local power switch of the monitor on. If the power indicator is on, try to adjust the monitor controls (BRIGHTNESS and/or CONTRAST). If there are lines visible the BRIGHTNESS is too high. When there are only lines visible and no messages, it could be that the video cable is not connected properly.

* THE KEYBOARD

If the keyboard responses are not recorded on the monitor screen, check the keyboard cable.

* THE PRINTER

See printer MAINTENANCE AND SERVICE.

PRECAUTIONS AND SERVICE

* DRIVE(S)

Make sure drives do not already contain disks before inserting a new disk. Do not jam or force disks into drives.

NOTE: FRONT COVER PANEL FOR CD DRIVE SHOULD REMAIN CLOSED WHEN NOT IN USE TO KEEP DRIVE UNIT FREE OF DIRT AND CONTAMINATION.

Keep fingers and/or objects away from drive when in operation.

DO NOT USE A DISK CADDY THAT IS DAMAGED. IF THE CADDY IS CRACKED OR BROKEN, ITS USE COULD DAMAGE THE CD DRIVE. KEEP THE CD CADDY IN EXCELLENT CONDITION.

Use care when loading and do not force the CD/CADDY into the CD drive. Gently place the CD/CADDY into the drive applying only slight pressure until the drive retrieves the disk. Applying undue force could damage the drive.

If CD/CADDY does not eject from the CD drive, check the drive opening and make certain the caddy's plastic lid is closed on both sides. If lid is completely closed and caddy still will not eject,

DO NOT ATTEMPT TO PRY CADDY OUT OF THE DRIVE. CALL FOR SERVICE.

If lid is not closed completely, use a small pocket-sized standard slot screwdriver and carefully reach into the drive and close the CADDY. Try again to eject the CADDY. If CADDY still will not eject, call for service.

* DISKS

All disks should be kept clean and dry and should be stored in their respective disk storage areas in the TECH 15 cabinet.

CAUTION: MAGNETIC MATERIALS SHOULD BE KEPT AWAY FROM ALL DISKS TO PREVENT POSSIBLE DAMAGE.
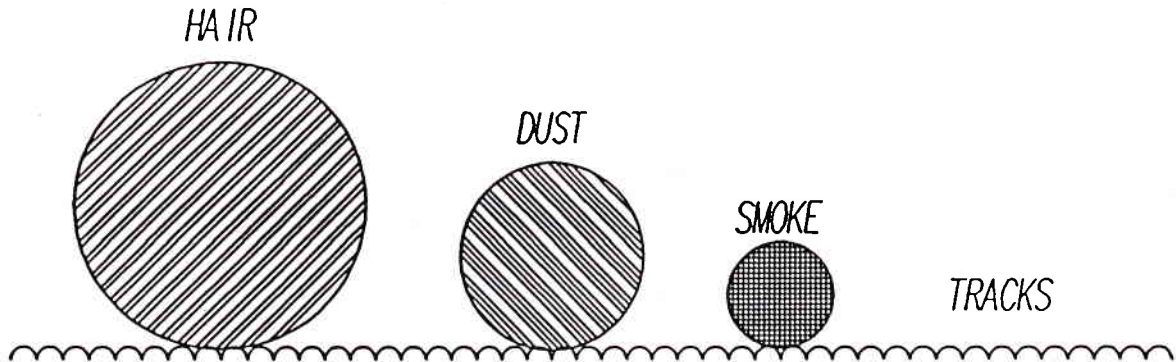
CD DRIVE MAINTENANCE

To prevent CD drive errors that result from environmental conditions such as dust and smoke, it is highly recommend use of the enclosed LLC-1 LASER LENS CLEANING DISK to clean the cd drive on a regular basis. Note directions on the back of LLC-1 disk holder.

3.5" DISKDRIVE MAINTENANCE

To prevent 3.5" Diskdrive errors, use the diskdrive cleaner according to the instructions included.

FILTER SERVICE

The filter to be concerned is located on the rear of the machine, at the fan area. It is removable and washable. Maintenance of this filter depends largely on shop conditions.

Start with a weekly cleaning and then adjust the cleaning schedule as required to maintain good air flow.

NOTE: Do not operate the system when the filter is wet.

CABINET MAINTENANCE

Clean the painted and plated surfaces with mild soap and water solution, rinse, and wipe dry.

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Lubricate the cabinet casters with a light viscosity machine oil. No other lubrication is required.

PRINTER MAINTENANCE

For trouble free operation, the printer should be cleaned as follows at least once a month:

NOTE: DO NOT APPLY ANY LUBRICANTS TO THE PRINTER.

1. Turn off printer ac power. Remove paper from printer.

2. Remove the printer access cover.

3. Using a clean, soft, lint-free cloth, dust the area around the carriage shaft, platen and paper sensor.

   Remove any loose paper particles or other debris.

PRINTER MAINTENANCE PARTS

1. Ribbon cartridge: epson # 7753.

2. Continuous paper: 8.5" X 11".

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TECH 15 RECOMMENDED SPARE PARTS LIST

ITEM	PART NO:	DESCRIPTION	QTY	NOTES
1	7096E4057-08	MONITOR (COLOUR, 14")	1	VISA MC6720
2	7096E4057-30	G2-386 COMPUTER	1	
3	7096E4056-90	PRINTER, EPSON LQ 850+	1	
4	7096E4057-10	KEYBOARD, "BTC" FT-7000	1	US (-11 TO -29) OTHERS
5	7096E9057-87	BOX OF MS-DOS 4.01 DISKS	1	
6	7096E9057-88	CD-ROM CADDY	1	
7	7096E9057-86	KEYBOARD COVER	1	
8	7096E9057-83	CD-ROM CLEANING DISK	1	
9	7096E9057-84	BOX OF 3.5" DISKS	1	
10	7096E9057-85	PRINTER RIBBON (7753)	1	
11	0528-0994	PRINTER PAPER, 8.5" x 11"	1	

G2-386 COMPUTER SPARE PARTS

ITEM	PART NO:	DESCRIPTION	QTY	NOTES
1	7096E4057-00	POWER SUPPLY, G2 COMPUTER	1	
2	7096E4057-01	MOTHERBOARD, 386, 25 MHZ	1	INTEL 386
3	7096E4057-02	DISK DRIVE, 3.5"	1	TEAC FD-235
4	7096E4057-03	VGA CARD + MEMORY	1	GENOA
5	7096E4057-04	HARD DISK CONTROL CARD	1	WESTERN DIGITAL
6	7096E4057-05	HARD DISK DRIVE	1	NEC D5655
7	7096E4057-06	CD ROM DRIVE	1	NEC CDR82
8	7096E4057-07	HOST ADAPTOR CD ROM	1	NEC T128
9	7096E4057-09	RAM, 1MB	1	SIMM