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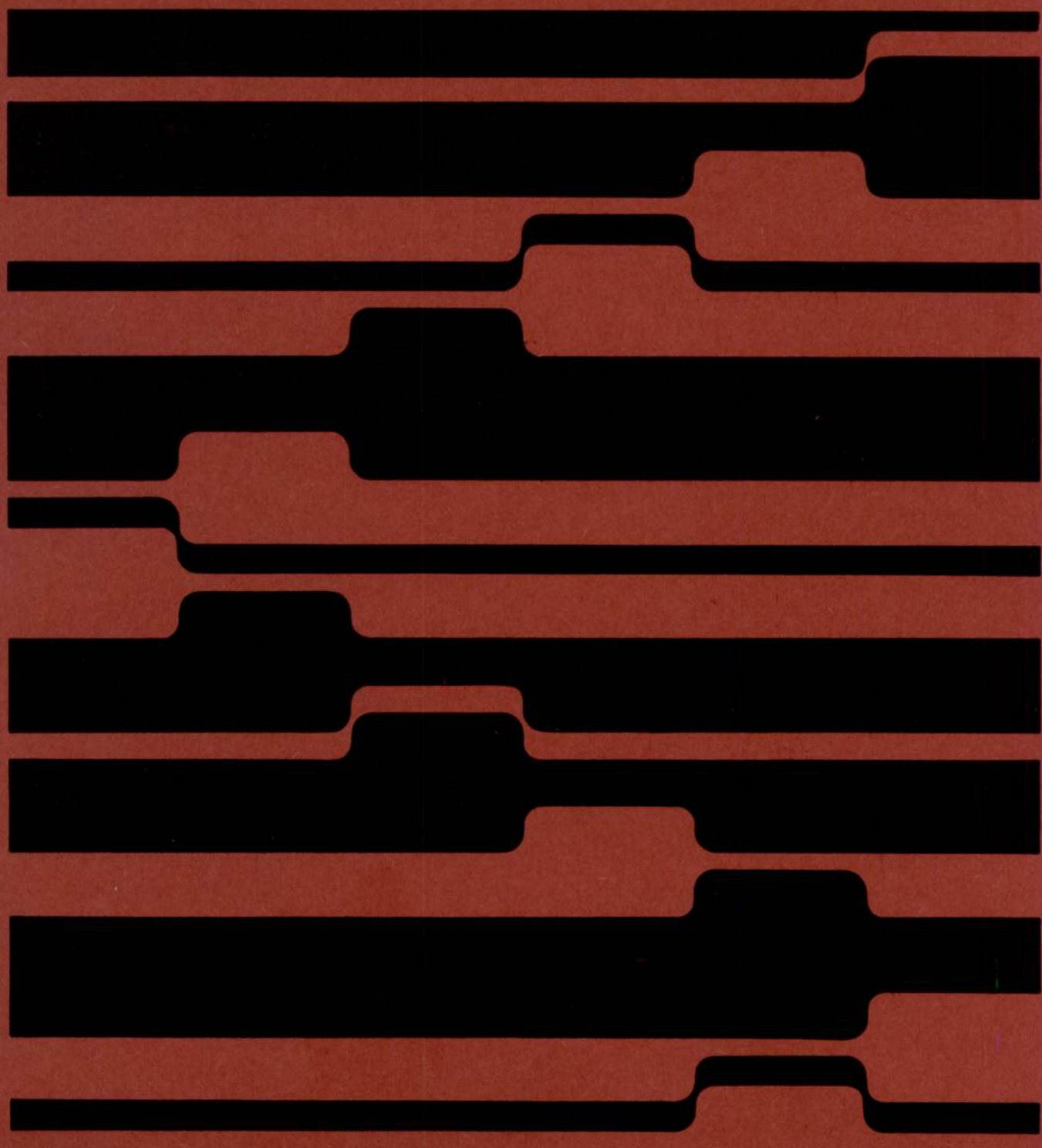
7904 Operation



7904 Operation

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Preface

This manual describes the operation of the 7904 Communications Processor running under COS 525 and acting as a message-buffering front-end processor for a 1900 Series mainframe. The 7904 provides a transition route for users who wish to develop their communications systems in a 1900 environment before carrying them forward to a 2900 Series running under DME. 7904 software performs in the same way under DME as it does under GEORGE 3/4 or MPOE.

This publication provides the basic information required by operations staff responsible for a 7904 processor front-ending a 1900 Series mainframe. The information in Chapters 2, 3 and 4 will also be of interest to systems programmers.

Contents

The text of this publication is divided into chapters in the normal way, and each chapter is subdivided into sections. A section's level in the hierarchy is indicated by its number. Therefore, within Chapter *n*, first level section headings are numbered *n*.1, *n*.2 and so on; second level headings are numbered *n*.1.1, *n*.1.2 . . . *n*.2.1 and so on; third level headings are numbered *n*.1.1.1, *n*.1.1.2 . . . *n*.1.2.1 and so on.

The contents list and index, and cross-references in the text, all refer to section numbers.

Pages are numbered within chapters, in the form *c-p*, where *c* is the chapter number and *p* the page number within that chapter. Figures and tables, where they appear, are also numbered within chapters, so that Figure *n*.2 is the second figure in Chapter *n*, and Table *n*.2 is the second table in that chapter.

Section numbers, page numbers and figure and table numbers in appendices are preceded by the letter A.

Hardware used on a 7904 system is described in this chapter. Section 1.1 introduces the various hardware components, and sections 1.2 to 1.7 give a guide to the various switches and indicators on each unit.

1.1 Hardware components

A 7904 system consists of the following hardware units:

1 7904 processor and store
2 Local Processor Link (LPL), connecting the 7904 to the mainframe
3 One of the following options:
   (a) A Communications Multiplexer (CMX)
   (b) A Command Chain Unit (CCU) and either a Medium Speed Scanner (MSS) or a Low Speed Scanner (LSS)
4 Local peripherals:
   (a) An executive console teletype
   (b) A paper tape reader

The 7904 processor is housed in one cabinet, and is connected to a maximum of 56K words of store in another cabinet. Peripherals may have direct access to store as well as access via the processor's store access control. Local peripherals are an operator's console for control of the 7904 and display of messages, and a paper tape reader which can be used for system loading or the loading of test software. A hardware ROM loader is fitted and this enables bootstrap programs to be loaded via the paper tape reader.

The communications network can be connected to the 7904 via a Communications Multiplexer (CMX) or a Command Chain Unit. The Command Chain Unit (CCU) is a processor that handles the communications lines according to commands supplied by the software. It is capable of performing complete message transfers, informing the 7904 on completion. The CCU operates via a scanner – either a Medium Speed Scanner (MSS) handling 16 lines at speeds between 50 bits per second and 9600 bits per second, or a Low Speed Scanner (LSS) handling 48 lines at speeds up to 300 bits per second. The Low Speed Scanner will handle only asynchronous devices, whereas the Medium Speed Scanner will handle both synchronous and asynchronous. CCU and scanners are housed in a separate cabinet.

The CMX is an alternative to the CCU scanner system where the high throughput of that type of system is not required. The CMX has a maximum throughput of 5K characters/second. It is basically a bit multiplexer and the system performs the necessary character handling. The CMX occupies one cabinet.

Connection from the 7904 to the mainframe is achieved by the Local Processor Link (LPL). This is a high speed parallel link for local connection of a 7904 to a 1900 standard interface. For connection to a large 2900 the LPL is connected via a standard interface module. The LPL, like the CCU, runs under program control and is capable of transferring complete messages without interrupting the 7904. The LPL has hardware bootstrap facilities to allow the 7904 store to be loaded from and dumped to the mainframe.

1.2 7904 processor and store

1.2.1 7904 processor

The controls on the 7904 processor are illustrated in Figure 1.1

The controls are as listed below. A switch is in the ON position when the flat part of the rocker is adjacent to the lettering on the cabinet.

Control	*Function*
POWER	Controls the power supply to the processor. When the switch is on, the indicator immediately below is illuminated
REMOTE	This is switched on if power to the processor is to be controlled by the power switch of another module in the system. If the remote power facility is not available, this switch should be left in the OFF position
ON-LINE	If this switch is set to ON the processor will operate normally. If the switch is set to OFF the processor will not accept any requests for interface transfers from its peripherals, although it will still be able to initiate interface transfers

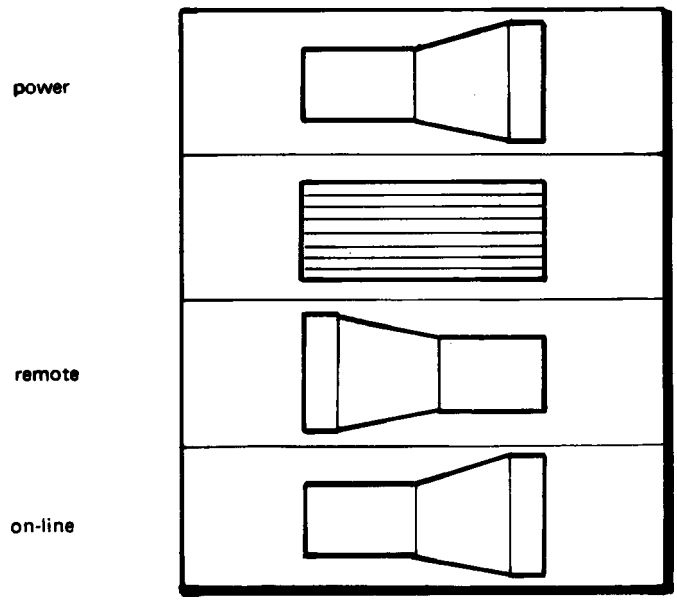


Figure 1.1 Processor controls

1.2.2 7904 store

The controls and indicators of the 7904 store are illustrated in Figure 1.2, and are described below. A switch is ON if the flat part of the rocker is adjacent to the lettering on the cabinet.

Control	*Function*
POWER	When this is switched on, the store is operational and the indicator immediately below will be illuminated
REMOTE	Always set to OFF
STORE REJECT	Normally set to OFF. If a parity error occurs, the parity indicator immediately below is illuminated. An engineer's program is then run, the STORE REJECT switch is pressed and the error is cleared

1.3 7987 Local Processor Link (LPL)

The POWER ON switch on the LPL is located on the power door. The POWER ON indicator will be illuminated when the switch is on and the LPL is operational. The indicator will flash

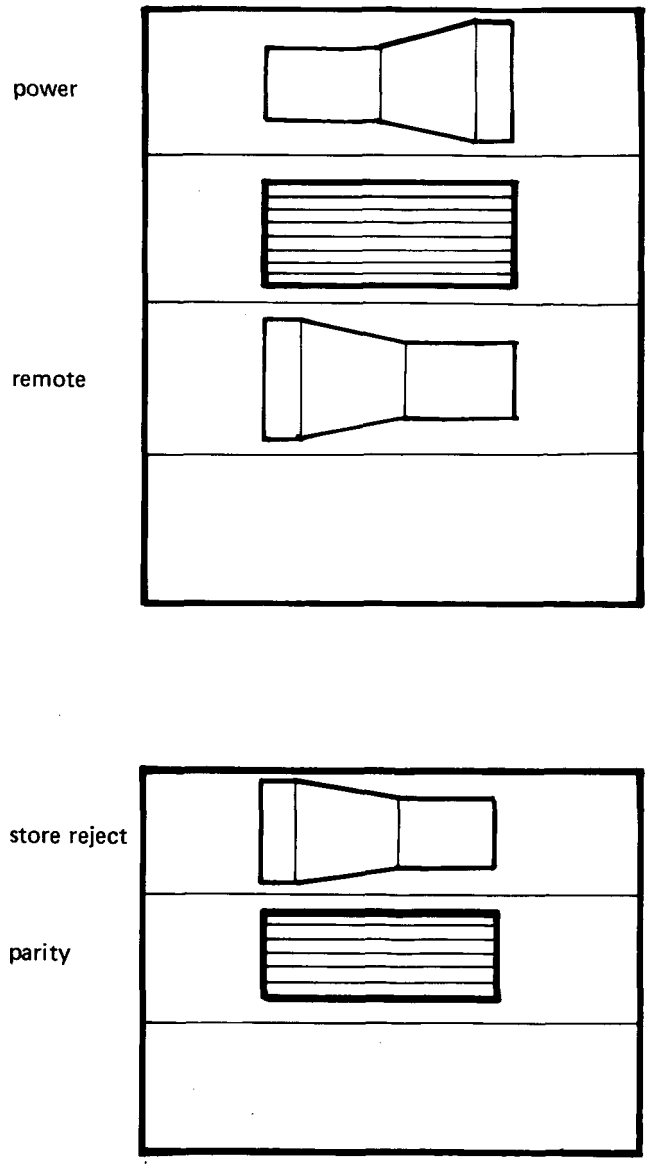


Figure 1.2 7904 store controls and indicators

repeatedly if certain error conditions are detected, in which case the LPL should be switched off until the fault is rectified.

The remaining controls and indicators on the front of the LPL are illustrated in Figure 1.3 and are as follows:

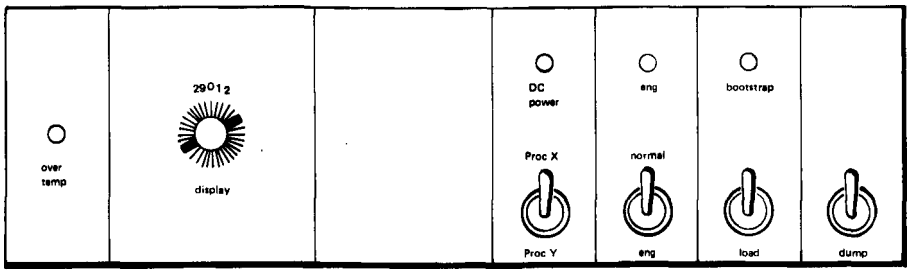


Figure 1.3 Local Processor Link controls and indicators

Control	*Description*
PROCESSOR X/PROCESSOR Y	This two-position toggle switch serves the function of an ONLINE/OFFLINE control, where position 'X' indicates that the processor is on-line
ENGINEER/NORMAL	This two-position switch determines whether the LPL is operating normally or under engineer control
LOAD	This is a momentary action toggle switch, biased to the 'off' position. When pressed it indicates to the mainframe that the 7904 is ready for loading
DUMP	This is a momentary action switch, biased to the 'off' position. The switch indicates to the mainframe that the 7904 is ready for dumping

The indicators on the LPL have the following significance:

Indicator	*Description*
OVER TEMP	This indicates that an abnormally high temperature condition has been detected in the LPL, and consequently power has been removed from the LPL
DC POWER	This indicates that all the DC power supply rails are operating within their specified limits
ENGINEER	This indicator is lit whenever the LPL is operating under engineer control
BOOTSTRAP	This indicator is lit when the LOAD or DUMP switches are pressed and indicates that the LPL is performing a bootstrap transfer (load or dump)

1.4 7955 Communications Multiplexer (CMX)

The controls and indicators for the CMX are the same as the top group of controls and indicators of the 7904 store (see Figure 1.2), and have the following significance:

Control	*Function*
POWER	Controls the power supply to the CMX. When the switch is on, the indicator immediately below is lit
REMOTE	This is switched on if power to the CMX is to be controlled by the power switch of another module in the system. If the remote power facility is not available, the switch should be left in the OFF position

1.5 Scanners

1.5.1 7950/02 Medium Speed Scanner (MSS)

The controls and indicators on the MSS are illustrated in Figure 1.4. The OVER TEMP and DC POWER indicators have the same significance as those on the LPL (see section 1.3).

The controls and indicators on the MSS are illustrated in Figure 1.4.

The display panel on the MSS is useful when tracing connection faults. There are four lights for each of the 16 channels as follows:

Light	*Significance*
DATA	Normally lit, flickers when the 7904 is sending or receiving on the channel
SYN	Normally unlit, is momentarily lit when the 7904 is receiving on the channel and achieves character synchronisation. Regular flashing indicates remote device is responding to polling
CON	Lit to indicate that the 7904 has issued a connect signal to the modem. It will stay lit even if DSR is not lit. If CON is unlit for a channel that normally works, an engineer should run tests on the CCU/MSS
DSR	Lit when the 7904 sees an (apparently) operable modem connected to the channel

Successful polls of a remote terminal are indicated by the DATA light dimming and the SYN light coming on – the sequence being repeated at regular intervals of up to ten per second.

Unsuccessful polls are indicated by the DATA light dimming at regular intervals without the SYN light coming on (Note: Under these circumstances, on certain line types the 7904 will not poll continuously, but will try for about ten seconds in every minute). Assuming that the connection through to the remote terminal is satisfactory, unsuccessful polls can occur for the following reasons:

1 The terminal is powered-off or is off-line
2 The terminal's polling address is incorrect
3 The terminal is set for the wrong line speed
4 The terminal is switched to standby/normal in a state that does not match the state currently expected at the 7904

1.5.2 7950/01 Low Speed Scanner (LSS)

The controls and indicators of the LSS are illustrated in Figure 1.5. The display panel on the LSS has one light per channel (numbered 0 to 63). A light is illuminated when an operable modem or terminal is connected to the channel, and flickers when the channel passes data in either direction. The LSS also has a channel selector switch, which selects up to 16, 32, 48 or 64 channels. Otherwise the LSS controls and indicators are the same as those on the MSS (see section 1.2.1).

1.5.3 Scanner error conditions

If no terminals on a scanner can be made to work, the following checks should be made:

1 The 'OVER TEMP' indicator is not lit (CCU, MSS, LSS)
2 The 'DC POWER' indicator is lit (CCU, MSS, LSS)
3 The 'BASE ADDRESS' selector has not been moved (normally 0 for MSS and 16 for LSS but can vary)
4 The 'CHANNEL' selector is set to span the correct number of channels (LSS)

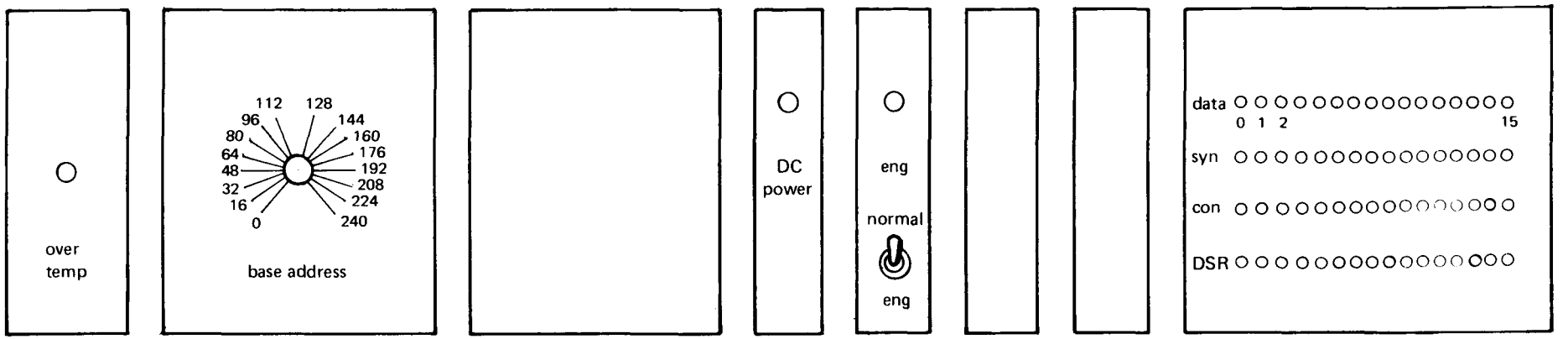


Figure 1.4 Medium Speed Scanner controls and indicators

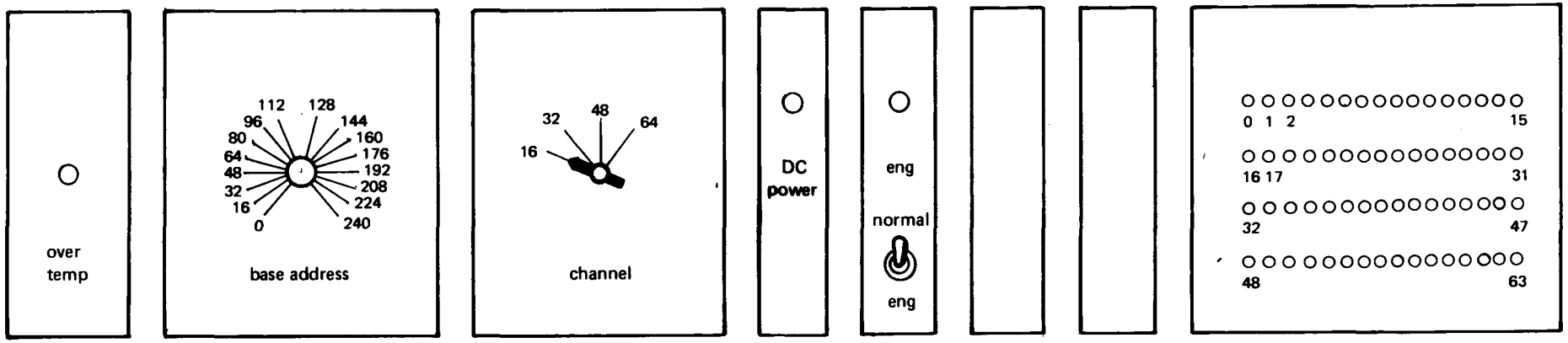


Figure 1.5 Low Speed Scanner controls and indicators

1.6 Local peripherals

The 7904 system has two local peripherals: the 7969 Console Teletypewriter and the 7961 Paper Tape Reader.

1.6.1 7969 Console Teletypewriter

Operating instructions for the console teletype are given below.

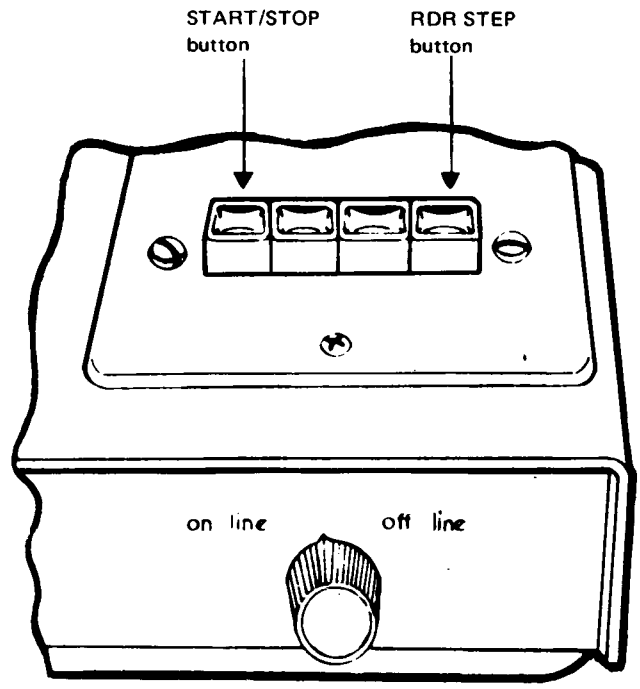


Figure 1.6 Teletypewriter control swtiches

1.6.1.1 *Switching on*

To switch on the teletype, refer to Figure 1.6 and proceed as follows:

1 Turn the rotary mode switch on the front panel to the off-line position
2 Connect the 13 amp plug to the mains supply
3 Check that the RDR STEP switch is glowing red
4 Press the START/STOP switch
5 Check that the motor indicator is glowing green

1.6.1.2 *Tape preparation and punching*

To prepare for using the tape punch, refer to Figure 1.7 and proceed as follows:

1 Set the rotary mode switch on the front panel to the off-line position
2 Check that the teletype is loaded with paper (see section 1.6.1.9) and the punch with blank tape (see section 1.6.1.10)
3 Switch on the teletype (see section 1.6.1.1) and press the ON button on the tape punch
4 Press the RUN OUT key until about 12 inches of blank tape have been produced
5 Characters can now be entered from the keyboard and will be printed and punched (Note: When starting a new line, the CARRIAGE RETURN and NEW LINE keys should always be pressed in that order.)
6 To punch the upper character engraved on a key, either the CTRL or SHIFT keys should be held down while the character is punched
7 To punch a character repeatedly, hold down the REPEAT key (and CTRL or SHIFT if desired) and press the required character key
8 To correct a wrongly-punched character, press the BACKSPACE button on the tape punch, followed by the RUB OUT key

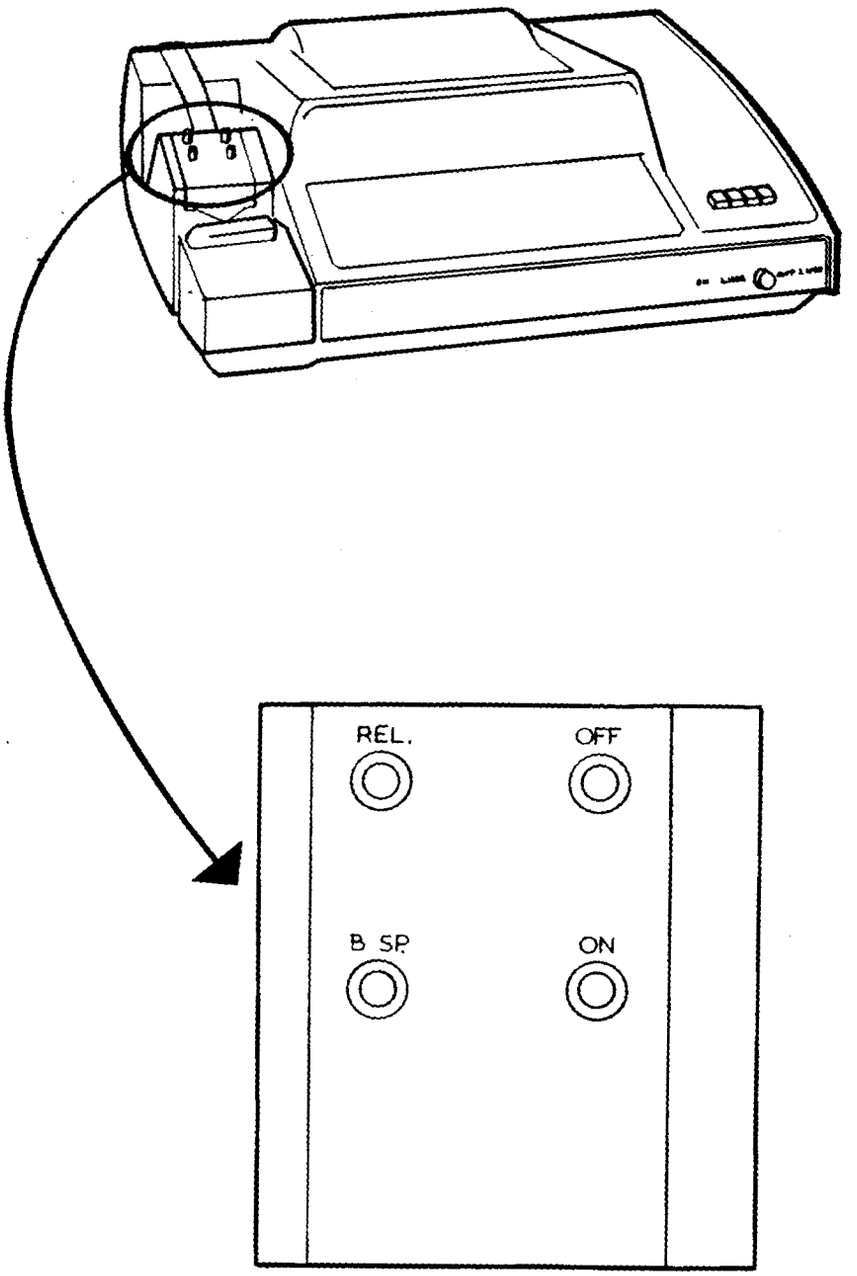


Figure 1.7 Console tape punch

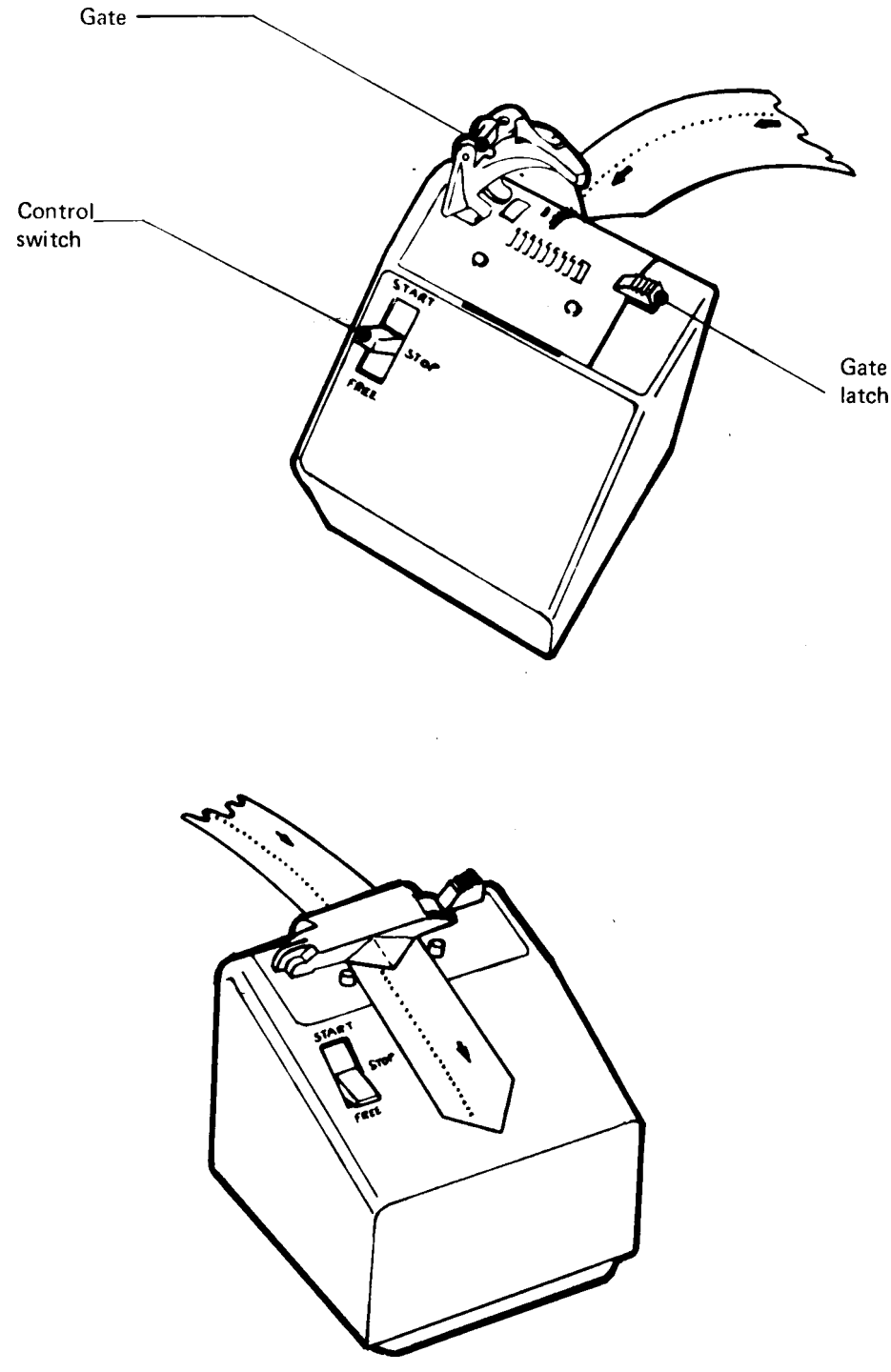


Figure 1.8 Console tape reader

9 When all the required information has been punched, continue as follows:
   (a) Press the RUN OUT key until about 12 inches of blank tape have been produced
   (b) Tear off the tape against the V-shaped projections

1.6.1.3 Loading the console tape reader

To load the console tape reader, refer to Figure 1.8 and proceed as follows:

1 Set the tape reader control switch to STOP
2 Open the gate by pressing the gate latch to the right
3 Position the front end of the tape to be read in the reader. The tape sprocket holes must be positioned towards the gate hinge
4 Ensure that the feed wheel pins are located correctly in the sprocket holes
5 Close the gate
6 Set the tape reader control switch to FREE
7 Move the tape backwards and forwards to ensure that it is properly seated
8 Set the tape reader control switch to STOP
9 The tape can now be read by moving the tape reader control switch to START or by pressing the RDR STEP switch on the console

1.6.1.4 Copying and printing tape

To perform tape copying and/or printing, refer to Figure 1.6 and proceed as follows:

1 Set the rotary mode switch to OFFLINE
2 If a tape is to be printed, check that the teletype is loaded with paper (see section 1.6.1.9)
3 If a tape is to be copied, check that the punch is loaded with blank tape (see section 1.6.1.10)
4 Load the reader with the tape to be printed and/or copied
5 If a duplicate tape is required, switch on the tape punch by pressing the ON button
6 Press the RUN OUT key until about 12 inches of blank tape have been produced
7 Set the tape reader control switch to START
8 The tape reader will stop automatically just before the end of the tape is reached, or when the tape reader control switch is set to STOP

1.6.1.5 *Tape editing*

To edit tapes, refer to Figure 1.8 and proceed as follows:

1 Load the console tape reader by performing stages 1 to 8 of section 1.6.1.3
2 Move the tape reader control switch to START
3 Set the tape reader control switch to STOP just before reaching the position to be altered
4 Press the RDR STEP switch on the console repeatedly until the last character before the amendment has been read
5 Type in the required alteration or insertion
6 Set the tape reader control switch to FREE
7 Pull the tape through the reader until the required number of characters has been omitted. Each click represents one character (Note: Spaces and control characters must be included).

Tapes can be compiled by reading successive source tapes onto one tape in the above manner, thus avoiding the use of tape splices.

Editing is simplified if about two inches of blank tape are run out when each section is prepared. This eases the subsequent problem of identifying the sections to be altered or inserted.

1.6.1.6 *Setting the console on-line*

To set the console teletype on-line, proceed as follows:

1 Switch on the teletype (see section 1.6.1.1)
2 Set the rotary mode control switch to the ONLINE position
3 Press CTRL together with Q on the console keyboard. This sets the channel on-line and active

During a program run, the console should not be set off-line unless this is required by the program.

When the console is on-line, the START/STOP switch should never be operated

1.6.1.7 *Unloading the console tape reader*

The console tape reader can be stopped at any time by moving the tape reader control switch to STOP. The reader will stop automatically just before the end of the tape is reached.

1 Perform one of the following:

(a) Set the tape reader control switch to FREE and pull the end of the tape through the reader

(b) Set the tape reader control switch to STOP, open the gate and lift the tape clear

2 Ensure that the control switch is set to STOP and that the gate is closed

1.6.1.8 *Switching off*

To switch off the console teletype, proceed as follows:

1 Set the rotary mode switch to the OFFLINE position

2 Press the STOP/START button on the console and check that the green light is extinguished

3 Disconnect the mains supply

4 Check that the red light is extinguished

1.6.1.9 *Loading the stationery*

Paper used in the teleprinter is 8½ inches (21.6 cm) in width. A roll of paper approximately 5 inches (12.7 cm) in diameter is used. The path of the paper and the components referred to in the following instructions are shown in Figure 1.9.

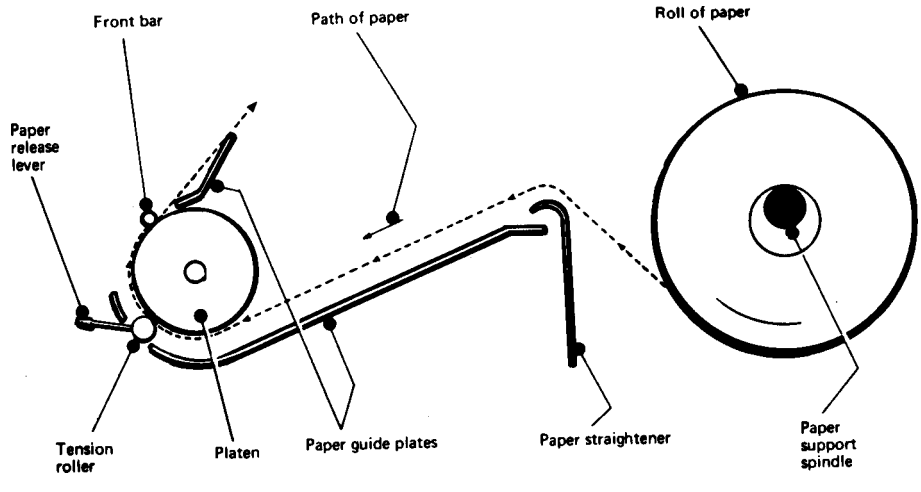


Figure 1.9 Path of paper in teletypewriter

To load the stationery, proceed as follows:

1 Ensure that the mains switch is off

2 Any paper left in the machine should first be removed. Tear off any paper projecting from the top of the platen and lift the typewriter cover. Pull the paper release lever forward to

release the tension roller pressure (the lever is at the right-hand side) and lift out the paper spool, withdrawing any unused paper from beneath the platen

3 Withdraw the paper support spindle from the old spool and place it in the new one, with equal lengths of spindle exposed at both ends of the roll

4 Place the new roll in the recess at the rear of the typewriter so that the ends of the spindle fit into the slots provided and the paper will unroll forward from the bottom of the roll

5 Fold back the leading edge of the paper and crease it so that it presents a firm, straight edge

6 Unrolling the paper, pass it forward and up over the paper straightener and then down and under the platen

7 Re-apply the tension roller pressure by pushing back the paper release lever

8 Advance the paper, by means of the platen knob, until it can be passed under the paper guide

9 Pull the paper release lever forward again and line up the paper

10 Push back the paper release lever and lower the typewriter cover

1.6.1.10 *Loading the tape punch*

To load the tape punch, refer to Figure 1.10 and proceed as follows:

1 Ensure that the chad box is in position

2 Cut the leading edge of the new tape into an arrow-head shape. Ensure that any adhesive or tape used to secure the roll is cut off

3 Insert the spindle into the tape spool with an equal amount protruding from the spool on either side

4 Place the spool in the left-hand side of the cover with the protruding spindle ends in the guides so that the tape will unroll forwards from the top

5 Check that the spool will rotate freely

6 Switch on the tape punch by pressing the ON button on the tape punch lid

7 Open the lid by lifting the projection at the front

8 Remove old tape from punch by pressing RUN OUT until all tape is out, or by pressing REL on the tape punch and pulling the tape clear

9 Insert tape into slot at rear and feed tape forwards until the end is stopped by the knurled feed wheel

10 Press the RUN OUT key until the end of the tape emerges from the front of the punch

11 Close the lid

12 Tear off surplus tape against V-shaped projection on lid

1.6.1.11 *Replacing the typewriter ribbon*

When the quality of the print begins to deteriorate, the ribbon should be replaced using the following procedure (Figure 1.11 shows the relevant components):

1 Raise the lid on the cover

2 Wind all the ribbon on to one spool and remove both spools from the friction spindle

3 Discard the spool with the old ribbon and retain the empty spool

4 Engage the hook on the end of the new ribbon in the hub of the empty spool. If there is no hook, pierce the end of the ribbon over the point of the arrow in the hub of the empty spool

5 Wind a few turns of ribbon on to the empty spool, in the direction indicated by the arrow, and ensure that the reversing eyelet has been wound upon the spool

6 Place the spools on the shaft so that the ribbon feeds to the rear from the right side of the right spool and from the left side of the left spool

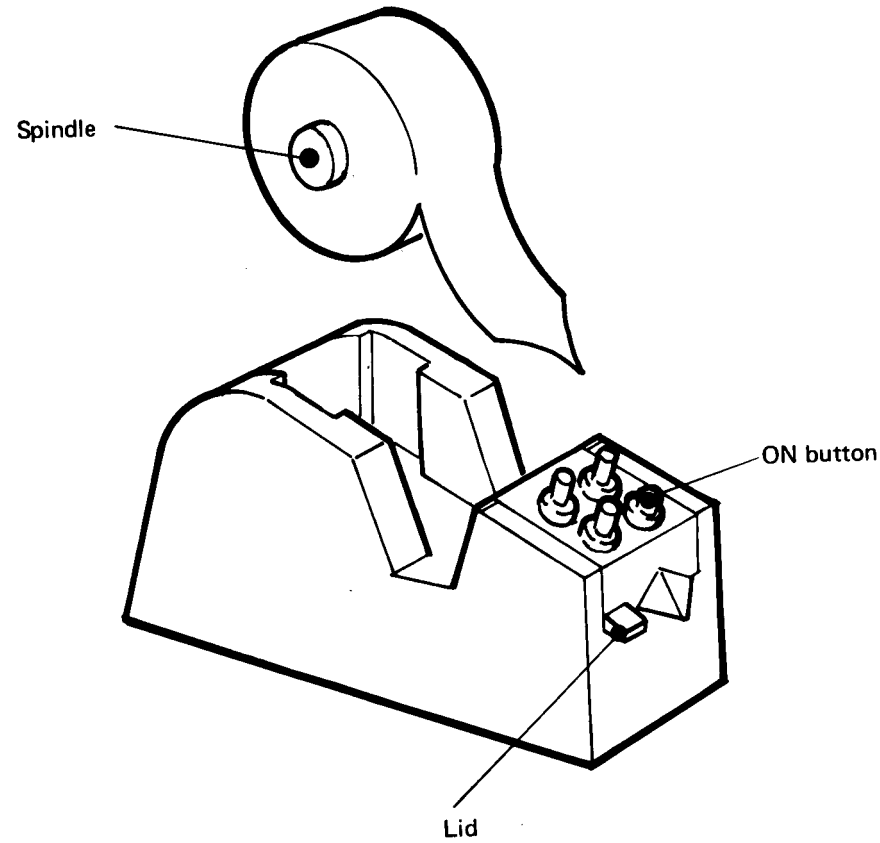
7 Turn each spool slightly until the driving pin on the spool engages the hole in the spool

8 Thread the ribbon from the right-hand spool:

(a) Around the outside of the right-hand vertical post

(b) Through the slot in the right-hand reversing arm

(c) Through the right-hand slot of the ribbon guide



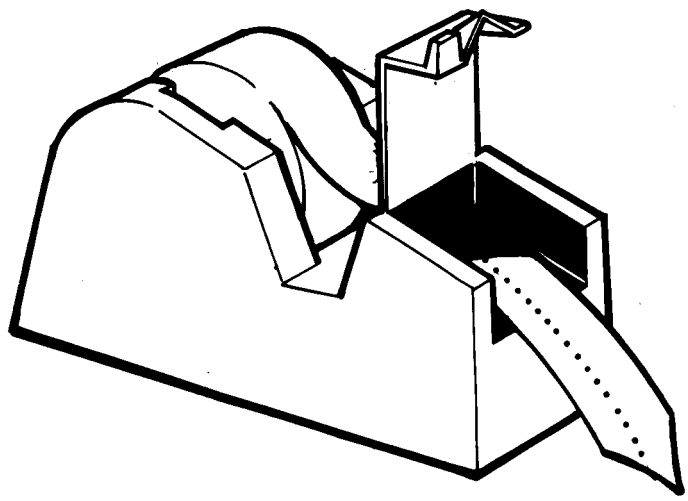


Figure 1.10 Loading tape punch

(d) Around the rear of the guide and back through the left-hand side of the ribbon guide
(e) Through the slot in the left-hand reversing arm
(f) Around the outside of the left-hand vertical post
(g) To the left-hand side of the left-hand spool

9 Rotate the spool manually to take up any slack in the ribbon

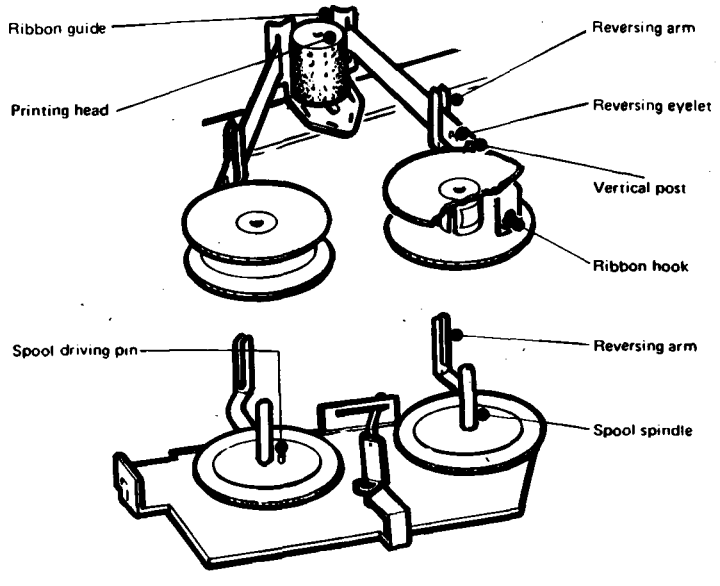


Figure 1.11 Replacing a ribbon

1.6.1.12 *User maintenance*

The exterior of the machine should be cleaned with a soft brush each day.

To test the action of the typewriter, first set the rotary mode switch to the off-line position. The action of the keyboard and printer can then be tested by typing a standard script including all characters.

1.6.2 7961 Paper Tape Reader

The switches and indicators on the paper tape reader are illustrated in Figure 1.12 and are as follows:

Switch	*Description*
MAINS	A two-position toggle switch at the back of the unit controlling the mains power supply to the reader
ONLINE/OFFLINE	Moving this switch to the ONLINE position and allowing it to return sets the reader online. Moving the switch to the off-line position and allowing it to return sets the reader off-line
SKIP LEFT/RIGHT	This switch only functions if the reader is off-line. Moving the switch to either position causes tape to be fed (but not read) at a speed of 500 cps in the direction specified. When the switch is released, tape movement will stop

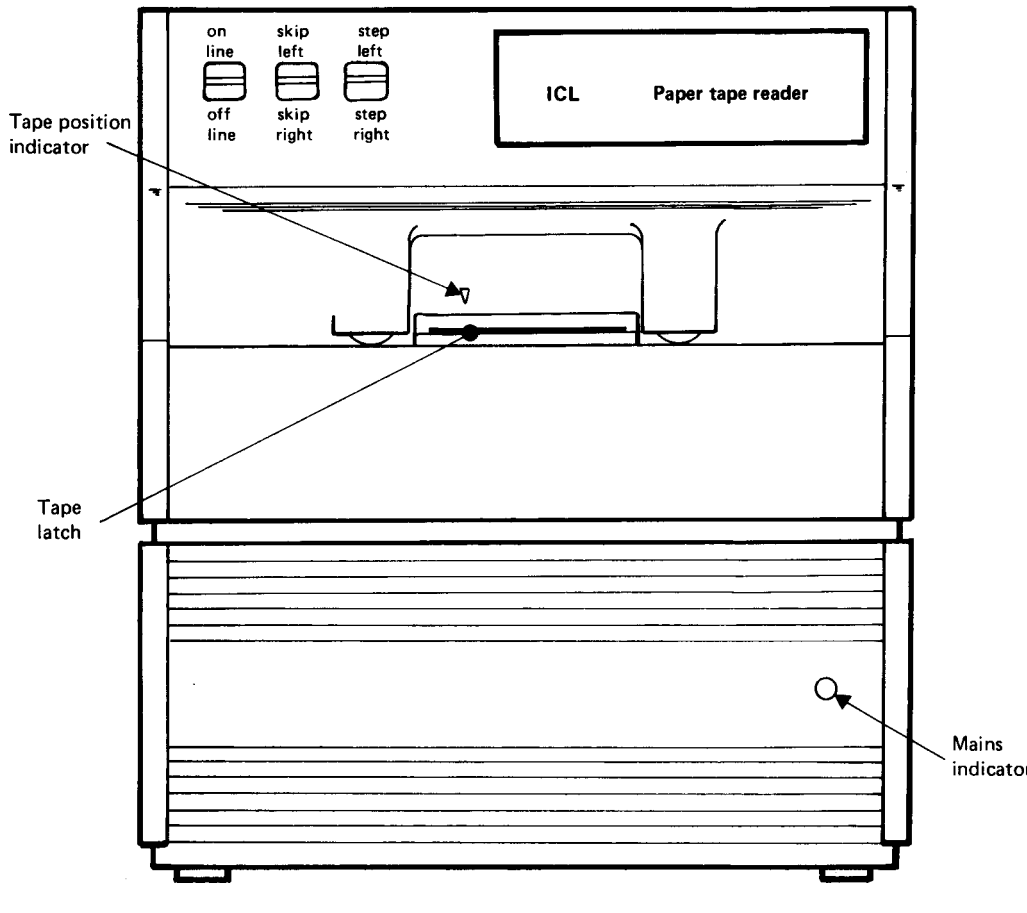


Figure 1.12 7961 Paper Tape Reader controls

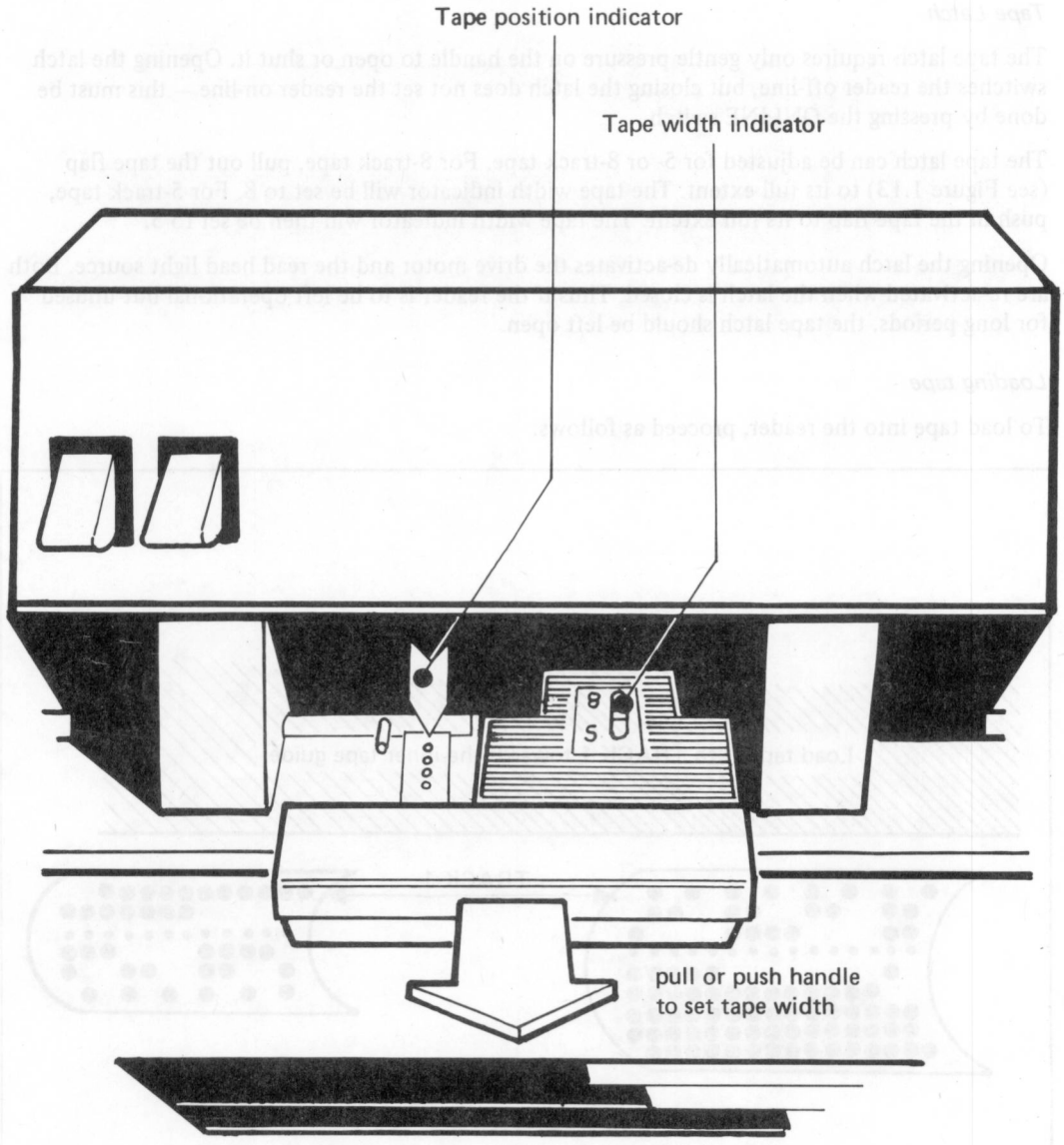


Figure 1.13 Tape latch assembly

Switch	*Description*
STEP LEFT/RIGHT	This switch only functions if the reader is off-line. Moving the switch to either position causes tape to be moved (but not read) one character pitch in the direction specified
MAINS INDICATOR	This is located on the front of the reader and is illuminated when the mains power supply is switched on and the reader is operational and ready for use

1.6.2.1 *Tape Latch*

The tape latch requires only gentle pressure on the handle to open or shut it. Opening the latch switches the reader off-line, but closing the latch does not set the reader on-line – this must be done by pressing the ONLINE switch.

The tape latch can be adjusted for 5- or 8-track tape. For 8-track tape, pull out the tape flap (see Figure 1.13) to its full extent. The tape width indicator will be set to 8. For 5-track tape, push in the tape flap to its full extent. The tape width indicator will then be set to 5.

Opening the latch automatically de-activates the drive motor and the read head light source. Both are re-activated when the latch is closed. Thus if the reader is to be left operational but unused for long periods, the tape latch should be left open.

1.6.2.2 *Loading tape*

To load tape into the reader, proceed as follows:

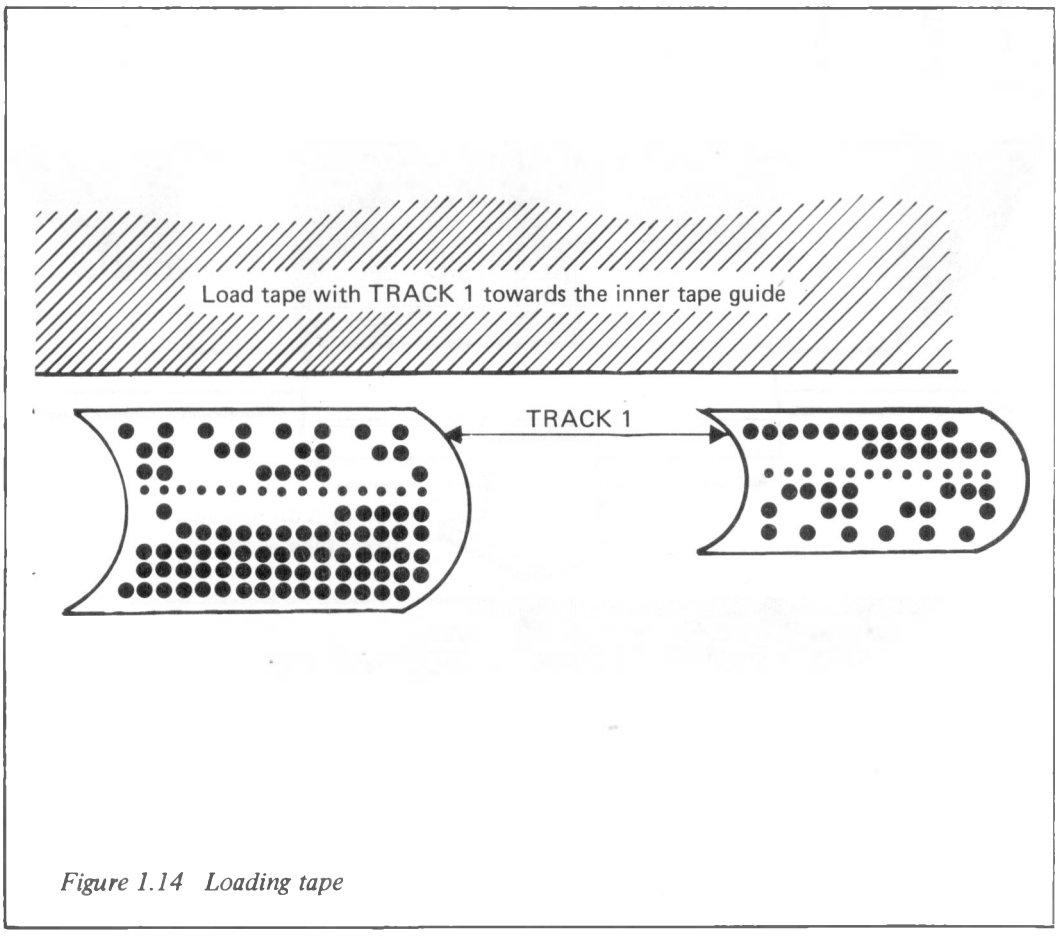


Figure 1.14 Loading tape

1 Check that the latch is set for the correct tape width (see section 1.2.8.1)

2 Raise the tape flap

3 Position the tape underneath the drive rollers with track 1 towards the inner edge guide (see Figure 1.14)

4 Lower the tape flap gently. This will align the tape with the inner edge guide and activate the drive motor and reading station lights

5 Switch the tape reader on-line

6 If it is required to start reading at a specific character rather than on the leader code, the preceding character must be aligned with the tape position indicator (see Figure 1.13) before the reader is switched on-line. The tape can be pulled gently through the reading station by hand, or the SKIP and STEP switches can be used to position the tape

1.6.2.3 *Unloading tape*

To unload tape from the reader, proceed as follows:

1 Switch the tape reader off-line

2 Open the latch and remove the tape

1.6.2.4 *Interrupting during input*

If it is necessary to stop the reader while it is carrying out an on-line operation, switch the reader off-line. The tape will then be in the correct position for reading to continue when the reader is switched on-line again. Do not interrupt an on-line operation by raising the tape flap. If this happens, the tape will come to an uncontrolled stop and be difficult to reposition.

1.6.2.5 *Tape dispensing*

The reader will handle tape from an unassisted tape dispenser if the following conditions are observed:

1 Supply reel must not exceed a diameter of 8 inches

2 The dispenser must be in line with the tape path of the reader

3 The dispenser must be positioned so that the tape enters the leading pitch roller gap at a shallow angle to the tape platform

4 The dynamic tape supply tension must not exceed 227g

1.6.2.6 *Tape editing*

Overlap and butt splices can be accurately read, if no light gaps are left within the code hole area, and the joints are smooth and correctly aligned. It is recommended that tape patches with punched sprocket holes are used for editing.

1.6.2.7 *Maintenance procedure*

Before any maintenance is carried out, the mains supply to the reader must be disconnected.

Maintenance procedures are as follows:

1 Each day, perform the following:

(a) Remove dust build-up on and around the tape latch with a soft camel-hair brush

(b) Remove any tape patch gum residue and particles from the brake pad surface and tape path with a soft cloth slightly dampened with methylated spirits

2 The paintwork should be kept in good condition by regular cleaning with a moist (but not wet) cloth and a non-abrasive domestic cleaner (soap powder or detergent)

1.7 Remote terminals

The information below on remote terminals applies particularly to cases when these terminals are controlled by a 7904 system. Some of the most common terminal states are described below for the termiprinter, 7181 VDU, and the 7020, 7502 and 7503 terminal systems.

If an attempt is made to input from a remote terminal when the 7904 is not connected to the mainframe, the 7904 will cause the message

LINE CLOSED

to be displayed at the remote terminal.

1.7.1 Termiprinter

Details concerning the operation of the termiprinters are given in the ICL publication *Termiprinter Operating* (Edition 1, TP4316).

The following two illuminated push-buttons are of interest:

STANDBY	When this is depressed the motor is switched off, but the terminal remains active in all other respects, so that for example it is still possible to key in messages
READY	This indicator is illuminated when the data communications equipment is ready to transmit data generated by the termiprinter

In addition, the Inhibit switch on the front of the termiprinter should be set to NORM before attempting input to the mainframe.

Certain error conditions may occur:

Condition	*Cause*
READY light remains on but no response when CTRL and A keys depressed	COS suspended, or line speed incorrect
Response to CTRL and A is LINE CLOSED message	COS live but no connection through to mainframe
READY light not illuminated	Telephone connection broken
Response to keyed input is LINE ERROR or TRANSMISSION ERROR – PLEASE RETYPE messages	Telephone connection bad (parity failure detected)
Unintelligible response to keyed input	Termiprinter RATE switch set incorrectly
Keyed input is printed after input data character has been reflected back	Reflect data on asynchronous line up to 1200 bps

1.7.2 7181 VDU

A full description of the 7181 VDU is given in the ICL publication *7181 A VDU Operating* (Edition 1, TP4297)

Some points to note when using the VDU for simple interactive work are:

READY light	For a satisfactory connection to the 7904 via modems (or other means) this must be lit
CNTRL + 1 keys	This is the break-in facility. The lack of response to break-in may be due to a COS system error (see section 7.1.3). The state of the system is shown by inspection of the message displayed on the screen. "LINE CLOSED" indicates that the device is not open through to the parent processor
Line errors	After recognition of parity or block check failure, the 7904 requests a repeat transmission and the manner in which the cursor moves about the screen is a common way of detecting this. Repeat transmissions in VDU receive mode may be similarly recognised but any problems arising from the code conversions that take place (in the LPL) from 6-bit 3-shift to ISO-7 are reported by display of the solid nothing-recognisable character
TYPE light	The VDU switches back into TYPE mode after satisfactory receipt of a message. If this is not happening, careful visual inspection of the indicator lights is advised. TYPE mode can be obtained in this case by pressing the white INTERLOCK key on the extreme right of the top row of the keyboard
SEND light	This is lit in the period between pressing the SEND key and the end of the transmission. It is useful for analysing the total response time and also for determining whether or not the COS or parent is responding

1.7.3 7020 terminal systems

Information on operating 7020 terminal systems is given in the ICL publication *7020 Communications Equipment Operating* (Edition 2, TP4237).

1.7.4 7502 terminal systems

Information on operating 7502 terminal systems is given in the ICL publication *7502 Operating* (Edition 1, TP4804)

1.7.5 7503 terminal systems

Operating information for 7503 terminal systems is given in the ICL publication *7503 Operating* (Edition 1, TP4801).

Some points to note in connection with the indicator lights are:

Indicator	*Comment*
LINE ACTIVE	For a satisfactory connection to the 7904 via modems (or other means) this must flash regularly
POLLED	This light is illuminated after the 7503 is polled. If the 7503 is being polled with an incorrect terminal address being specified, this is not lit
TRANSMIT	This indicates messages being transmitted (sent or received). Satisfactory polling is recognised by the regular flashing of this light
LINE ERRORS	In view of the difference between pauses in data traffic due to COS or parent delays and line errors it is necessary to watch the timing of the light flashes. Data retransmissions are requested by an immediate poll

1.8 Powering the 7904 on and off

Details are given below of the procedures for powering the 7904 up and down.

1.8.1 Powering on procedures

If the remote power facility is available, proceed as in section 1.8.1.1, otherwise proceed as in section 1.8.1.2.

1.8.1.1 *Powering on the 7904 (remote power facility)*

To power up the 7904 using the remote power facility, proceed as follows:

1 Check the following:
   (a) The POWER and REMOTE switches on the processor (and the CMX where used) are both in the ON position
   (b) The LPL (and the CCU where used) is powered off
2 Switch on the executive console (see section 1.6.1.1)
3 Check that the REMOTE switch on the store is in the OFF position
4 Switch on the POWER control on the 7904 store cabinet. This will power on the processor (and the CMX where used)
5 Switch on the POWER ON switch located on the LPL power door
6 If a CCU is used, power on the CCU by means of the switch at the base of the CCU cabinet

1.8.1.2 *Powering on the 7904 (without remote power facility)*

If the remote power facility is not available, the 7904 should be powered on as follows:

1 Check the following;
   (a) The REMOTE switches on the processor and store (and CMX where used) are in the OFF position
   (b) The POWER control on the processor is in the OFF position
2 Switch on the POWER control on the 7904 store cabinet
3 Switch on the executive console (see section 1.6.1.1)
4 Switch on the POWER ON switch located on the LPL power door

5 If a CCU is used, power on the CCU by means of the switch at the base of the CCU cabinet

6 Switch on the POWER control on the processor

7 If a CMX is used, switch on the POWER control of the CMX

1.8.2 Powering off procedures

If the remote power facility is being used, proceed as in section 1.8.2.1, otherwise proceed as in section 1.8.2.2.

1.8.2.1 *Powering off the 7904 (remote power facility)*

To power off the 7904 when the remote power facility is being used, proceed as follows:

1 If a CCU is used, power off the CCU

2 Switch off the execution console (see section 1.6.1.8)

3 Switch off the POWER control of the LPL

4 Switch off the POWER and REMOTE switches of the following units in the order specified:

(a) Store

(b) Processor

(c) CMX, where used

1.8.2.2 *Powering off the 7904 (without remote power facility)*

To power off the 7904 where the remote power facility is not used, proceed as follows:

1 If a CMX is used, switch off the POWER control of the CMX

2 Switch off the executive console (see section 1.6.1.8)

3 Switch off the POWER control on the processor

4 If a CCU is used, power off the CCU

5 Switch off the POWER control of the LPL

Setting up the 7904 for communications control involves several processes:

1 Network configuring process
2 Patching process
3 Loading and dumping procedures

The *network configuring proeess* is used to supply COS with details of those elements of the terminal configuration that are to be controlled by COS. This process is performed by using the Network Configuring Program (NCP), which is described in section 2.2.

The *patching process* is the means by which software patches are incorporated into the COS system. This process is described in section 2.3.

The configured COS produced by the NCP or patching processes is loaded into the 7904 by the load program. Loading and dumping procedures are described in section 2.4.

2.1 Files issued to the user

Various files are issued by ICL to be used in conjunction with the processes mentioned above. Complete lists follow of files issued for both GEORGE 3/4 and MPOE systems.

2.1.1 GEORGE 3/4 files

The following files (originally written by macro NEWCOPYOUT) are supplied by ICL on magnetic tape:

Filename	*Contents*
PROGRAM XBAA	Dump program binary (#XBAA)
PROGRAM XBAB	Load program binary (#XBAB)
PROGRAM XBAC	Print dump program binary (#XBAC)
PROGRAM XBAD	Print formatted dump program binary (#XBAD)
PROGRAM XBAE	Patch selection program binary (#XBAE)
PROGRAM XBAF	Assembler program binary (#XBAF)
PROGRAM XBAG	Network configuration program binary (#XBAG)
XBAAJD	Macro to run PROGRAM XBAA
XBABJD	Macro to run PROGRAM XBAB
XBADJD	Macro to run PROGRAM XBAD and PROGRAM XBAC
XBAEJD	Macro to run PROGRAM XBAE and PROGRAM XBAF
XBAGJD	Macro to run PROGRAM XBAG and PROGRAM XBAF
ICL7904TEMPL	Templates File
ICL7904BASE	COS master File
ICL7904TKEY	Turnkey Master File
SITEOPTIONS	Site Options File
COSFILES	See below
LETTERDEFS	Data file used by ZLETTERS
ZLETTERS	Utility used by XBADJD

When the issue tape is received from ICL, the GEORGE macro NEWCOPYIN should be used to read COSFILES into filestore. COSFILES is then used as a steering file for NEWCOPYIN to read into filestore all the other files on the tape.

2.1.2 MPOE files

The following files (originally written by function 2 of the 1900 Series program #XPJW) are supplied on magnetic tape by ICL:

Filename	*Blocks per bucket*	*Buckets*	*Description*
PROGRAM XBAA	1	28	Dump program binary (#XBAA)
PROGRAM XBAB	1	32	Load program binary (#XBAB)
PROGRAM XBAC	1	36	Print dump program binary (#XBAC)
PROGRAM XBAD	1	80	Print formatted dump program (#XBAD)
PROGRAM XBAE	1	72	Patch selection program binary (#XBAE)
PROGRAM XBAF	1	88	Assembler program binary (#XBAF)
PROGRAM XBAG	1	92	Network configuration Program binary (#XBAG)
TEMPLATE7905	1	240	Templates File
BASE7905FILE	4	88	COS master File
TKEY7905FILE	4	88	Turnkey Master File
OPTIONS7905	1	80	Site Options File

In addition, two files necessary are:

Filename	*Blocks per bucket*	*Buckets*	*Description*
LIBY7905FILE	4	88	System File
SCRATCH7905	1	592	Source File

These last two files must have been created on disc before priming down from the magnetic tape by using #XPJW.

All the files listed in this section are described under their relevant processes (see sections 2.2, 2.3 and 2.4).

2.2 Network Configuring Program (NCP)

A description of the NCP is given below. Full details of the program are given in Chapter 3.

2.2.1 Files used by the NCP

When configuring and generating a COS system suitable for loading into a 7904, all program, disc and graphic files are provided on magnetic tape. The exception is the Specification File by which the user may define his terminal configuration. This file is constructed by the user. Descriptions of Specification File construction and other NCP operating procedures for GEORGE 3/4 and Manual Executive users are given in Chapter 3.

The files used by the NCP are listed below. This list should be read in conjunction with Figure 2.1, and with the NCP description in section 2.2.2.

File	*Description*
COS Master File	A core image binary copy of one of the standard 7904 COS systems. This is used as the base for the specific COS required by the site, and is an input file to #XBAG (ICL-supplied)
Turnkey Master File	A core image binary copy of the standard message buffering turnkey program. This is an input file to #XBAG (ICL-supplied)
Templates File	A character file of approximately 2000 records containing standard control blocks and other templates necessary to tailor the basic COS required by the site. This is an input file to #XBAG (ICL-supplied)

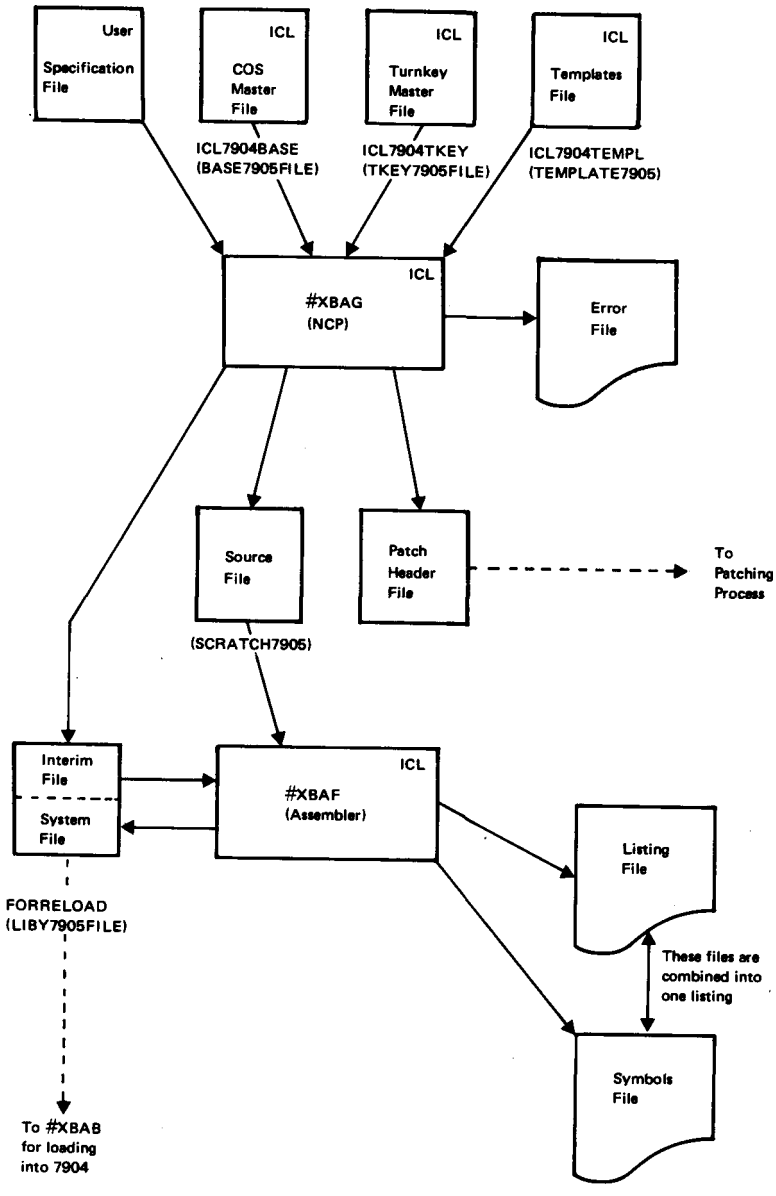


Figure 2.1 Network configuring process

File	*Description*
Specification File	This user-supplied file contains details of the communications equipment to be linked to the 7904. This is an input file to #XBAG
Error File	A line printer file output by #XBAG, recording errors originating from the Specification File or the combining of files within #XBAG
Source File	A character file of approximately 3000 to 10,000 records written by #XBAG, and consisting of the processed form of the Specification File and Templates File. After #XBAG has terminated, the Source File is used as input for #XBAF, for subsequent assembly to binary
Patch Header File	A file of approximately 100 records written by #XBAG. It contains details of the structure of COS to enable patches to be applied
Interim File	A core image system file, created by #XBAG and used as input to #XBAF
System File	A file holding the configured COS. This file is suitable for bootstrap loading into a 7904 using program #XBAB
Listing File	This line printer file, written by #XBAF, is an assembly listing of the Source File and provides a record of the control block structures that have been built
Symbols File	A line printer file written by #XBAF containing a listing of the assembly symbols used by #XBAF and appended to the listing file

2.2.2 The NCP process

The NCP is the means by which configuration details for Base Systems are supplied to COS.

A Base System is one which has all the necessary software modules present to enable the desired facilities to be provided, but does not have any terminals configured. Details of terminal configuration must be supplied before the Base System can be used. This configuration information is supplied by the user in the Specification File (see section 3.1.2).

Standard Base Systems are designed for normal use of 7904. Where a customised version is required, a different base will need to be specified in detail and the appropriate licences obtained. Details of the specification process are to be found in the ICL publication *7905 Running SYSGEN* (Edition 1, TP 4890). Orders for customised versions need to be placed well in advance, and may require several months for delivery.

Standard Base Systems are always supplied on 1900 magnetic tape for loading into a disc file, whereupon the 7904 Network Configuring Program can access it to supply the configuration details.

Customised systems will be supplied on paper tape.

Configuring Standard Base 7904 Systems in 1900 mainframes requires two 1900 programs, #XBAG and #XBAF. These programs enable a base 7904 system (that is, one generated without a configuration) to be configured on-site to suit the site's actual configuration. The user constructs a Specification File (see section 3.2) containing steering information for #XBAG (see Figure 2.1). The program reads this file and three ICL-supplied master files, and produces an Interim File (in binary) and a Source File in 7904 NAL (Assembly language). The 7904 NAL assembler #XBAF is run on #XBAG's output files and transforms the Interim File into the System File, suitable for loading directly into a 7904. Also output by #XBAG is the Patch Header File containing system-dependent information for 7904 patching as described in section 4.2.

Where the NCP is run under GEORGE 3/4 the macro XBAGJD is used to run #XBAG and #XBAF. This macro is described in section 3.3.1.

2.3 NRL patches

Patches issued by ICL are incorporated into COS by means of the patching process. This process uses the 1900 Series programs #XBAE (patch selection program) and #XBAF (Assembler program). Patches are issued in the New Relocatable Language (NRL).

2.3.1 Files used in the patching process

The various files used in the patching process are listed below. This list should be read in conjunction with the description of the patching process given in section 2.3.2, and with Figures 2.2 and 2.3.

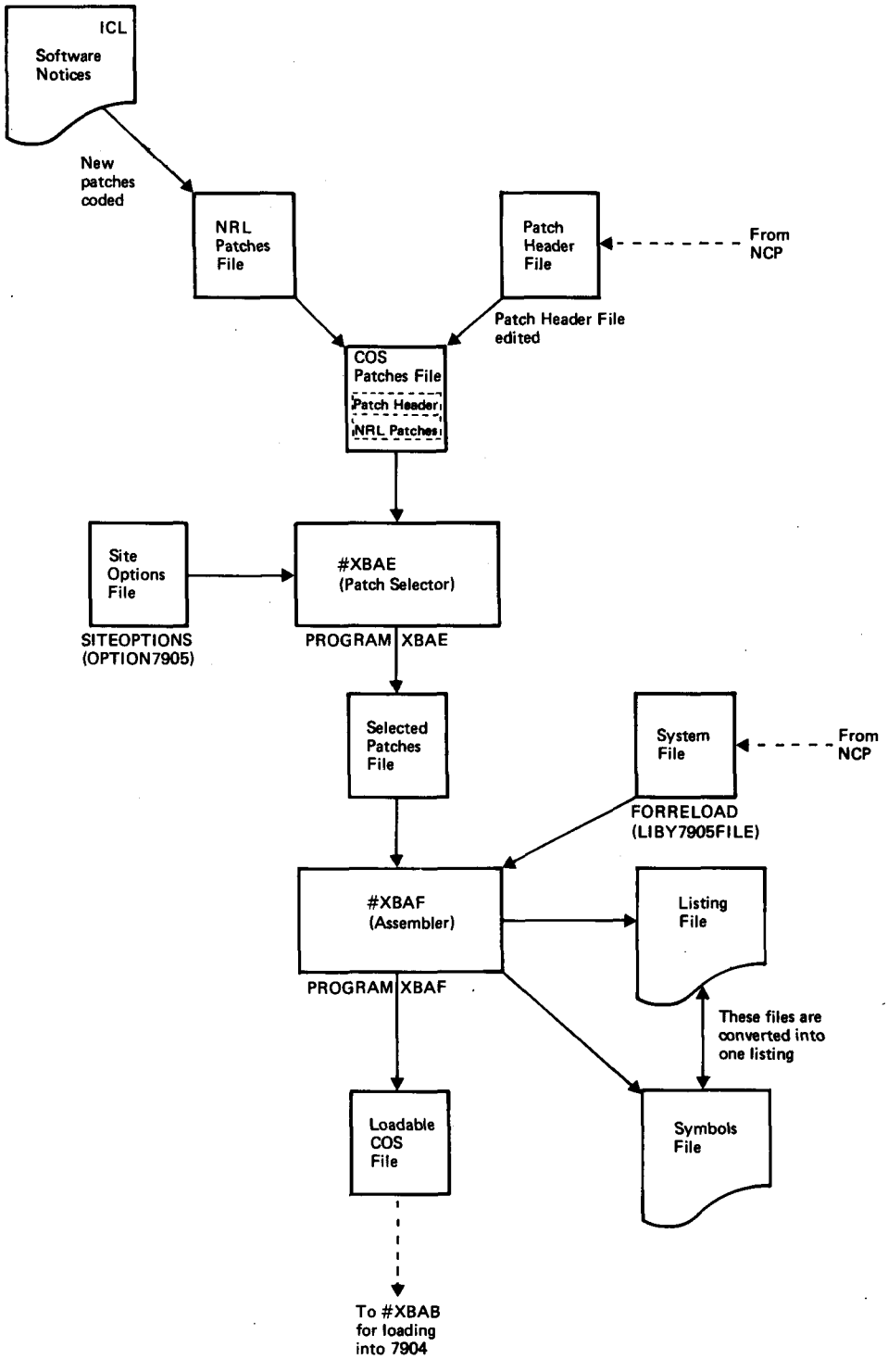


Figure 2.2 Patching process (first time)

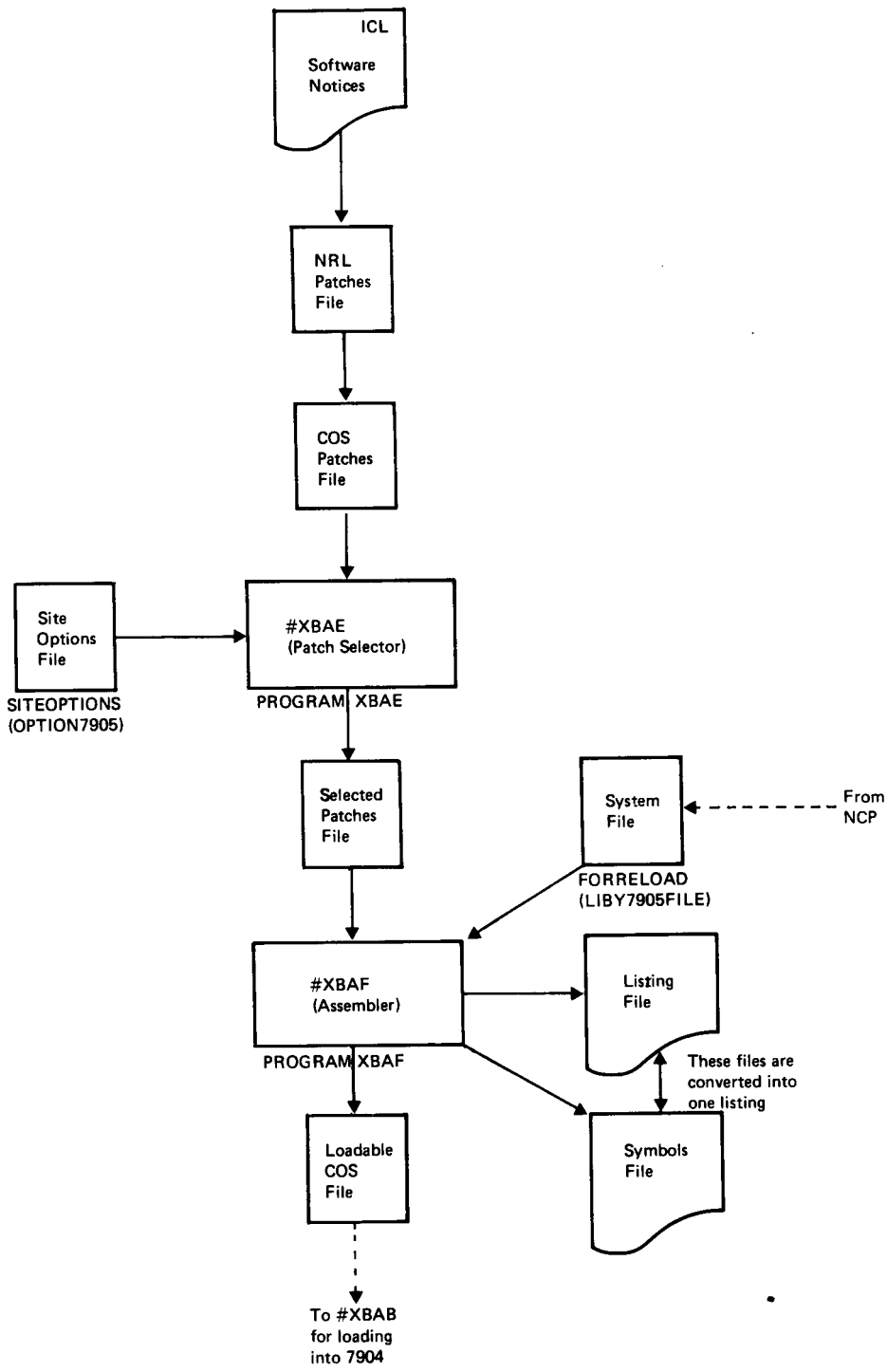


Figure 2.3 Patching process (subsequent times)

File	*Description*
NRL Patches File	A coded file produced from patches supplied by ICL. This file contains all patches issued to the standard COS Master file
Patch Header File	A file output from the NCP, containing details of the structure of COS, to enable patches to be applied
COS Patches File	A combination of the above two files. Used as input to #XBAE
Site Options File	The COS steering and option control file, used by #XBAE to select patches required for the specific COS
System File	Holds the current version of the COS to which the patches will be applied. Held in binary and output by the NCP
Selected Patches File	Holds the patches selected and output by #XBAE
Loadable COS File	The updated version of COS output by #XBAF, ready for loading into the 7904 by #XBAB
Listing File	A disc file to which the output from the patching process can be listed

2.3.2 The patching process

When patches are first issued by ICL, in the form of Software Notices, they are coded and written to the NRL Patches File (see Figure 2.2). This file is then added to the Patch Header File (output from the NCP) to form the COS Patches File.

Subsequently when patches are issued, they are coded and written to the NRL Patches File, which is then added to the existing contents of the COS Patches File (see Figure 2.3).

In both cases, #XBAE then reads the COS Patches File and, using the steering information from the Site Options File, selects the patches required for the specific COS to be used.

The patches selected by #XBAE are written to the Selected Patches File, which is used as input to #XBAF. This program assembles the selected patches and applies them to the current version of the COS (held in the System File). The result of this is the Loadable COS File (an updated System File) produced by #XBAF, and containing the COS ready for loading into the 7904 (see section 2.4).

#XBAF also outputs two files, the Listing File (providing a record of the control block structures that have been built) and the Symbols File (containing a list of the assembly symbols used by #XBAF). These two files are combined in one listing, and can be output to disc before being printed.

Programs #XBAE and #XBAF can be run under either GEORGE 3/4 or MPOE. Where the programs are run under GEORGE, the macro XBAEJD is used to combine the two programs into one patching process (see section 4.2.1).

2.4 Loading and dumping the 7904

There are four programs used in conjunction with loading and dumping:

Program	*Function*
#XBAA	Dumps 7904 store to mainframe
#XBAB	Loads 7904 from mainframe
#XBAC	Produces a hexadecimal print of the dump output by #XBAA
#XBAD	Produces an analysis of the dump output by #XBAA

The files used in loading and dumping under GEORGE 3/4 are as follows:

Description	*Filename*
7904 Load File	FORRELOAD (default name) or user-specified filename
7904 Dump File	User-specified filename

The files used in loading and dumping under GEORGE 3/4 are as follows:

Description	*Filename*
7904 Load File	LIBY7905FILE
7904 Dump File	POST7905FILE

The loading and dumping procedures are illustrated in Figures 2.4 to 2.6. These figures show the filenames of the various files for systems running under GEORGE 3/4 (filenames for systems running MPOE are given in brackets). Where no filename is shown, the filename is user-specified.

2.4.1 Loading the 7904

The 7904 is loaded by running the program #XBAB. Where the 7904 is to be loaded following the NCP process, #XBAB loads the contents of the System File (see Figure 2.4), which is output from the NCP process. Where loading is performed following the patching process (see Figure 2.5), #XBAB loads the contents of the Loadable COS File. This file is an updated System File, and is output from the patching process.

2.4.2 Dumping the 7904

Dumping the 7904 is performed by using the program #XBAA. This causes the contents of the 7904 store to be output to the user-specified Dump File (see Figure 2.6).

Two further programs can be used at the mainframe in conjunction with the Dump File: #XBAC produces a line printer listing of the file, and #XBAD produces a line printer analysis of the dump.

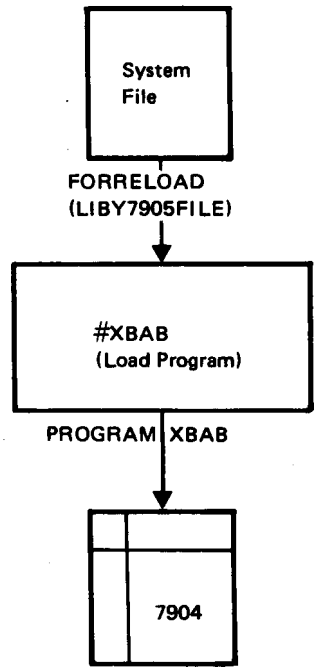


Figure 2.4 Loading the 7904 after the NCP process

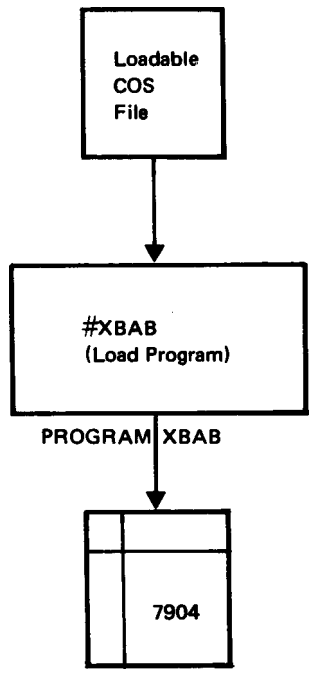


Figure 2.5 Loading the 7904 after the patching process

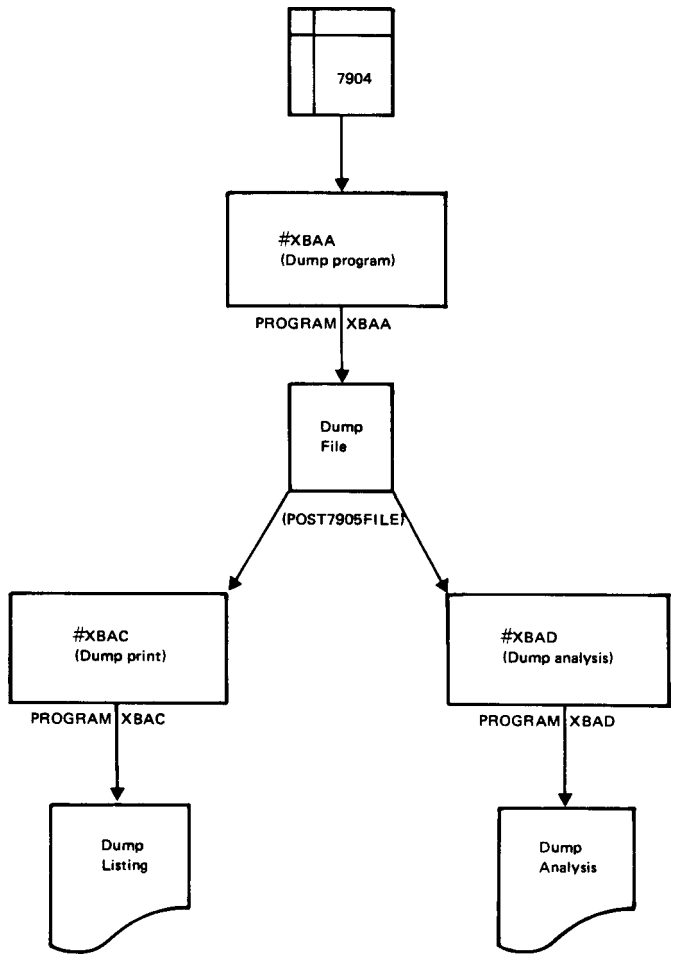


Figure 2.6 Dumping the 7904

Information on running the NCP is given in this chapter. The NCP uses the programs #XBAG and #XBAF, which are described in section 3.1. Details of how to specify records in the Specification File are given in section 3.2, and section 3.3 provides operating instructions for the NCP.

3.1 Program actions involved

This section describes the actions performed by #XBAG and #XBAF.

3.1.1 #XBAG

#XBAG maps the communications equipment configuration of a particular site onto a standard COS. This is a four stage process, as follows:

1 The user Specification File is validated against the COS Master File. If any syntax errors are found, the run is abandoned (Note: Non-syntax errors, such as specifying more than 16 lines on a Medium Speed Scanner, are not tested for, and users are recommended to perform careful desk-checking on the Specification File records before running the NCP)

2 The COS Master File and the Turnkey Master File are merged to form the Interim File

3 The Specification File and the Templates File are processed to produce the Source File and the Patch Header File

4 Any errors found are recorded in the Error File

Once initiated, #XBAG reads the Specification File and validates its contents. Any errors encountered are reported on the Error File with an explanatory message and a copy of the failing command record. If any errors are encountered, the program terminates with an error halt once the Specification File has been read.

While reading the Specification File, the program #XBAG builds complex internal linkages, and, to guard against program failure caused by corruption of these linkages, processing of a command record is aborted if an error is encountered in that record. Thus, if a command record contains more than one error, the first error only in that record is logged, hence several validation runs may be required. However, validation runs are very short, lasting only as long as it takes to read the Specification File.

Program halts for #XBAG are listed in Appendix 2.

3.1.2 #XBAF

In the NCP process, #XBAF uses the Source File and the Interim File to produce the System File. This involves the following actions:

1 The Source File, originally encoded in NAL, is compiled into binary form

2 The binary-compiled Source File is overlaid onto the Interim File to produce the System File

3 An assembly Listing File and a Symbols File, containing details of control block structures, are also produced

Once #XBAF has terminated successfully, the System File is complete and ready for loading. It is not possible to load this file unless #XBAF terminates successfully, nor is it possible to load the COS Master file.

Program halts for #XBAF are given in Appendix 2.

3.2 Specification File records

The Specification File consists of a number of command records. Each command record is composed of a command mnemonic followed by a number of parameters separated by commas.

An example of a Specification File is given in Appendix 3.

3.2.1 Command records

The available commands are:

Command	*Parameters*
NAME	Has one parameter, a text string of up to 30 characters, which will be included in the 7904 system identity message (see below). The date on which the system is built is automatically included. Thus the command: NAME,MOP SYSTEM MK2 used in a system built on 9th January 1979 would give the 7904 system identity message: 7904 COS ISSUE *issue number* MOP SYSTEM MK2 09/01/79 This message is output by the 7904 on the local teletype console when COS has been successfully loaded
SIZE	Has one parameter, the store size of the target 7904 machine. This parameter must be either 56K or 48K. If the command is omitted, 56K is assumed. The following is an example of the command: SIZE,48K
SCAN	This command is only required if the target 7904 machine has a Command Chain Unit with a scanner. The parameter is either M*n* (for Medium Speed Scanner) or L*n* (for Low Speed Scanner) where *n* is the number of lines on the scanner, for example: SCAN,M16 defines an MSS with 16 lines (0 to 15) SCAN,L48 defines an LSS with 48 lines (0 to 47). If this command is omitted the target 7904 is assumed to have a Communications Multiplexer
EM	This command specifies the parent identifier number referring to the card reader emulated by 7904 Error Manager. From this stream communication errors are reported to the file :ENG.ELBSFILE7905 in the mainframe. If the EM command is omitted, error management facilities will not be active in the system. For example, the command EM,I110 defines the Error Manager stream to have identifier 110 (see section 8.1)

The remaining commands specify the communications devices. Each command begins with a mnemonic indicating the device. The mnemonic is followed by up to six parameters in each command, each parameter commencing with an identifying character. Thus the order of parameters within a command is not significant.

The commands are as follows:

Command	*Parameters*
L	CCU line number or CMX port number for this device. In the case of CMX, where higher speed line (4800 bps and upwards) cards require two or more ports, this is the lowest numbered port
A	The hex polling address of the device (if applicable)
I	The parent identifier number referring to this device
S	The line speed in bps. One of 100, 110, 300, 600, 1200, 2400, 4800, 9600. If absent, this parameter is defaulted to 110 for teletype lines or 2400 for other devices. For asynchronous lines valid speeds are 100, 110, 300, 600, 1200. For synchronous lines valid speeds are 1200, 2400, 4800, 9600
Q	The hex address of a QLSA if the video is connected via a QLSA
C	The hex address of an XBM cluster -- defaulted to hex 20
AA	No parameters. Indicates auto-answer (for TW devices only, at speeds up to 300)

Command	*Parameters*
P	A single parameter specifying the line protocol, as follows: B Basic mode X Extended Basic Mode (XBM) The PB or PX command is only used in records beginning with the device mnemonic TELE, and the command is only necessary if this is the first reference to the line protocol (see examples). If the command is omitted and the line protocol has not been referenced previously, an error will be reported

The device mnemonics are:

Mnemonic	*Device*
VC	7181 Video Console
TW	7071 Teletype or compatible device
PW	7020 Console Typewriter
CR	7020 Card Reader
TR	7020 Tape Reader
LP	7020 Line Printer
DLP	Direct output line printer on 7502 on Basic Mode link
TP	7020 Paper Tape Punch
XPW	RJE console on XBM link
XCR	RJE card reader on XBM link
XLP	RJE line printer on XBM link
XVC	Video Console (interactive) on XBM link
TELE	Teleload address of device on XBM or Basic Mode link
SLP	Soft format loop printer on 7502 on XBM link
VSI	Video standby input magnetic file (floppy disc) on XBM link
VSO	Video standby output magnetic file (floppy disc) on XBM link

Examples

```
TW,L5,175
```

indicates teletype on line 5 at 110 bps – identifier 75.

```
VC,I40,L0,Q20,A26,S4800
```

indicates 7181 video identifier 40 on line 0 with QLSA address 20 (hex), device address 26 (hex) at 4800 bps.

```
TELE,PX,L8,A26,I20
```

indicates that identifier 20 with teleload address 26 (hex) is on line 8 of a device on an XBM link.

```
VC,L3,I59,A2C
TELE,L3,I58,A24
```

The TELE record here indicates that identifier 58 with teleload address 24 (hex) is on line 3 of a device on a Basic Mode link. No PB command is required, since line 3 has already been defined in the VC record as having a 7181 Video Console (which operates in Basic Mode), with address 2C (hex), as identifier 59.

There are two other command records that are significant. A record beginning with a + sign is a comment record and is ignored. A record beginning with four asterisks is the terminator record for the Specification File.

An example of a Specification File is given in Appendix 3.1.

3.2.2 Command errors

Errors in command records in the Specification File are reported by a message of the format shown below. The message is displayed immediately after the incorrect record, as follows:

record
**** message*

The various values of *message* are explained in Appendix 3.2.

3.3 Operating procedures for NCP

Operating instructions for running the NCP are given below. Section 3.3.1 describes this process in a GEORGE 3/4 environment. Running the NCP under MPOE is described in section 3.3.2.

3.3.1 Configuring under GEORGE 3/4

To execute a full system configuration under GEORGE 3/4, the macro XBAGJD should be called. The format of this macro is as follows (optional parameter in square brackets):

XBAGJD IN*specfile*,BIN*systemfile*,PATCH*patchfile*[,CORE*n*]

where

specfile is the name of the user-supplied Specification File
systemfile is the name of the System File
patchfile is the name of the Patch Header File
n is the size of core allocation for #XBAF in K words. This parameter is optional and has a default value of 25

Example

XBAGJD INSPECFILE,BINLOADFILE,PATCHPATCH

The macro must be called in a job run under the username owning all files read into filestore from magnetic tape. The above macro will use the file SPECFILE as an input file and PATCH and LOADFILE as the output files.

The macro if successful will display "RUN COMPLETED OK" on termination. Program halts for #XBAF and #XBAG are given in Appendix 2.

3.3.2 Configuring under MPOE

When executing a system configuration at the mainframe under MPOE, the following dialogue takes place between Executive and the user.

Instruction from user	*Response from Executive*	*Comment/user action*
FI #XBAG		Instruction to find #XBAG
GO #XBAG 20		Instruction to run #XBAG from entry point 20
	OK	#XBAG executed successfully
	DLTD-FI #XBAF	#XBAG is deleted with an instruction to find #XBAF. Patch Header File is output to a direct access file
GO #XBAF 22		Instruction to run #XBAF from entry point 22
	HALT-WHAT CORE TO X0 PLEASE	Request for location 0 to be altered to required core allocation for #XBAF
AL #XBAF 0 25		Instruction to alter location 0 to 25K words (this is the recommended default)
GO #XBAF		Instruction to run #XBAF
	OK DISP-ASSEMBLY COMPLETE DISP-OK	This sequence of messages indicates that #XBAF has terminated successfully, having produced a configured COS system in LIBY7905FILE (the file generation number has been increased by 1). #XBAF has been deleted

Any errors resulting from #XBAG are listed in the Error File at the line printer. If there are no errors, #XBAG creates the Source File on disc.

Errors resulting from #XBAF will cause the new generation of LIBY7905FILE (created by #XBAG) to be deleted.

A list of program halts for #XBAF and #XBAG is given in Appendix 2. Any other halts should be reported through the normal software error reporting procedure.

Software patches issued by ICL are written in New Relocatable language (NRL) and incorporated into COS via the patching process. Full details of this process are given in section 4.1, and operating instructions are given in section 4.2.

4.1 The patching process

Details of files used in the patching process are given below, in sections 4.1.1 to 4.1.5. This is followed in section 4.1.6 by a guide to the steps to be taken to carry out this process.

4.1.1 COS Patches File

Under MPOE, the COS Patches File is a subfile called FORASSEMBLY within a composite disc file called COSPATCHES under GEORGE, the file is a graphic (non-binary) file. The last record of the patch program in the COS Patches File must be ENDPROGRAM so that, when adding patch records to the existing file, the ENDPROGRAM record is removed from the end of the existing file and inserted at the end of the added records. Thus the end of the file always appears as:

```
.
.
.
record n-1
record n
ENDPROGRAM
***F
```

4.1.2 Patch Header File

The Patch Header File is output from the NCP process, and contains information concerning the positions and lengths of standard code blocks and patch areas within the COS to which the patches will refer. This information is unique for each COS.

For standard 7904 systems the Patch Header File is produced as a result of the Network Configuration Program #XBAG, and the record values for the start of free space in each segment are replaced by the characters ???? (see the example below):

```
SET       SECTION.BASE ???? // IN MODULE MODULE.NAME
BSECT     CODE.E001 IN MODULE.NAME AT SECTION.BASE
[*] INCLUDE OPTION.NAME
SET       .LABEL1   50+SECTION.BASE
SET       .LABEL2   48+SECTION.BASE
[*] CONTINUE
[*] INCLUDE NOT (OPTION,NAME)
//        LOCAL LABELS IN MODULE MODULE.NAME
SET       .LABEL1   ????+SECTION.BASE
SET       .LABEL2   ????+SECTION.BASE
[*] CONTINUE
```

This allows the values for a particular COS to be inserted. The correct values are found in the Link Map document supplied with the COS, and ICL support will provide assistance where necessary.

For non-standard 7904 systems, the Patch Header File is supplied by ICL and tailored accordingly.

4.1.3 Site Options Files

The Site Options File contains data that is used by #XBAE to ensure that only those patches applicable to the system configuration are selected.

For standard 7904 systems, the Site Options File is supplied by ICL.

For non-standard systems, the Site Options File is produced from two files used during the SYSGEN process on 7905, the steering and the options control files. Details of the SYSGEN process are given in the ICL publication *7905 Running SYSGEN* (Edition 1, TP4893). Assistance with producing a non-standard Site Options File is available from the local ICL representative.

The Site Options File, in common with all files for standard 7904 systems, is initially copied to a disc file. Under MPOE the Site Options File is a card file, and in this case, the file is punched out by running #XBAG from entry point 23.

4.1.4 System File

The COS to be patched is held on disc as a binary dump, read from the magnetic tape on which it was was supplied, or as produced by the dump program #XBAA. The COS is held in the System File, for which the GEORGE macro default name is FORRELOAD. Under MPOE, the filename is LIBY7905FILE.

When COS is to be patched, a new generation of the file containing the COS is created, and it is this file that is patched.

4.1.5 Selected Patches File

#XBAE produces the Selected Patches File, which contains those patches that are appropriate to the particular system configuration. Under GEORGE this file is a workfile that will be allocated to #XBAF for assembly. Under MPOE, this file is a direct access file called SCRATCH7905. At the end of the assembly, if no errors are found, the patches will have been applied to the COS, and the process is terminated.

Details of error conditions are given in section 4.3.

4.1.6 Procedures for patching

NRL patches are issued via Software Notices. On receiving a Software Notice containing patch information, the procedure given below should be followed:

1 Create the NRL Patches File, using the punched-up patches from the Software Notice as the records of this file

2 If the patches are the first set to be issued, proceed as follows (see also Figure 2.2):
   (a) Edit the Patch Header File by inserting the correct values to replace the ???? characters (see section 4.1.2)
   (b) Add the contents of the NRL Patches File (created in step 1) to the contents of the edited Patch Header File to form the COS Patches File

3 For subsequent patch issues, add the new patches (in the form of the NRL Patches File) to the existing patches in the COS Patches File (see Figure 2.3), ensuring that the ENDPROGRAM record is inserted immediately before the terminator record (***F)

4 (a) Under GEORGE, execute the XBAEJD macro, which will run #XBAE followed by #XBAF
   (b) Under MPOE, run #XBAE and #XBAF as shown in section 4.2.2

4.2 Operating procedures

4.2.1 Patching under GEORGE 3/4

The two programs #XBAE and #XBAF are run by calling the macro XBAEJD, the format of which is:

XBAEJD *S*_source file_,*D*_binary dump_,*O*_option file_,*L*_listing file_,

where

source file is the name of the COS Patches File, in which the NRL patches to be selected and assembled are held (default name is COSPATCHES)

binary dump is the name of the System File, in which the binary dumped COS to be patched is held (default name is FORRELOAD)

option file is the name of the Site Options File, in which the COS steering and options control data is held (default name is SITEOPTIONS)

listing file is the name of a disc file into which the contents of a workfile created by XBAEJD are listed (default of this parameter causes the output from XBAEJD to be listed directly to the line printer)

Example

XBAEJD *SPATCH,*DFORRELOAD(6),*OOPTIONS,*LLIST

The figure (6) indicates the file generation number of the System File. If the generation number is omitted, the highest generation is assumed.

4.2.2 Patching under MPOE

There are three environmental requirements for running these programs under MPOE:

1 After a successful run of #XBAE, the program will delete with an instruction to the Executive to find #XBAF. Therefore to take advantage of this automatic facility each program must be in its own library file, otherwise the finding of #XBAF will fail

2 Since program #XBAF creates a direct access file, a disc with Scratch Inhibit Clear must be available to the program

3 The Selected Patches File SCRATCH7905 must be available

Program #XBAF has one entry point for 7904 systems.

The patches are applied to LIBY7905FILE. The generation number is specified by altering word 0 to the generation number required (*n* in example below).

Program #XBAF will halt with a request 'WHAT CORE TO X0 PLEASE'. Although one area of the dictionary held within the program may expand dynamically, a second area of this dictionary must be preset to a certain size, reflecting the size of code to be assembled. For assembling NRL patches, assigning a value of 25K should be sufficient. This is done by altering word 0 to 25.

Example

The following example illustrates the running of #XBAE and #XBAF at the mainframe under MPOE.

1 Load and find program #XBAE, as follows (indented lines show the system response):

```
GO #XBAE 20
    #XBAE; CR 4-FR
    #XBAE; CR 4-FIX
```

2 When #XBAE has finished, it deletes itself. #XBAF is automatically found and entered, as follows:

```
GO #XBAF 20
    #XBAF; HALT- INPUT GENERATION TO X0 PLEASE
AL #XBAF 0 n
GO #XBAF
    #XBAF; HALT-WHAT CORE TO X0 PLEASE
AL #XBAF 0 25
GO #XBAF
```

(*n* is the generation number required)

3 The selected patches will then be assembled and applied. #XBAF deletes itself on completion.

4.3 Error conditions

Possible causes of errors during the patching process are given below:

Error	*User action*
Incorrect values substituted for ???? characters in NRL patches (see section 4.1.2)	Inform local ICL representative. When correct values are inserted, run #XBAE and #XBAF again
Transcription errors	Inform local ICL representative
Patch area overflow (see below)	Inform local ICL representative

Patch area overflow means that all the patch space has been used up, and certain patches will not have been applied. Where this occurs as a result of the addition of a patch, that patch will contain a warning in comment. The errors will be reported by the following message:

ERROR 19 ON LINE *line no*

Line *line no* begins with the following:

PATCH. AREA. OVERFLOW

5.1 Programs for loading and dumping

The four programs used in loading and dumping are #XBAA, #XBAB, #XBAC and #XBAD. Their functions are described in section 2.4.

5.2 Operating procedures

5.2.1 Running the programs under GEORGE 3/4

5.2.1.1 *#XBAA*

When running under GEORGE 3/4, the macro XBAAJD is called to run this program. The format of the macro is as follows:

XBAAJD *filename*[,O]

where

filename is the name of the file to which the dump is to be written. Language code and absolute generation number may be included, but relative generation numbers should not be used.

O is the overwrite option and, when present, overwrites the dump file if it already exists. If the file does not already exist this parameter is ignored. If the file already exists and this parameter is absent, the question "DO YOU WISH TO OVERWRITE?" is output. The answer to the question should be 'Y' or 'N' as appropriate.

Example

XBAAJD DUMP2(/DUMP),O

5.2.1.2 *#XBAB*

When running under GEORGE 3/4 the macro XBABJD is called to run this program. The format of the macro is as follows:

XBABJD *filename*

where *filename* is the name of the file to be loaded. The default for this parameter is FORRELOAD.

Example

XBABJD MOPSYSTEM

This command causes the contents of the file named MOPSYSTEM to be loaded into the 7904 store.

5.2.1.3 *#XBAC and #XBAD*

When running under GEORGE 3/4, the macro XBADJD is called to run these programs. The macro produces an analysis of the dump file and a print of the control block and buffer areas. The format of the macro is as follows (optional parameters in square brackets):

XBADJD *filename*[,E] [,!*text*] [,NOCHECK] [,FULL] [,NOPRINT] [,NOANAL] [,*CR*filespec*]

where

filename is the name of the dump file
E is optional and erases the dump file(s) after printing
!*text* is optional and puts the comment *text* into the printout heading
NOCHECK is optional and suppresses the validity checks on control block addresses
FULL is optional and causes a full print to be produced
NOPRINT is optional and suppresses the print, giving the analysis only
NOANAL is optional and suppresses the analysis, giving the full print only
*CR*filespec* is optional; *filespec* is the name of the file containing the steering lines (if any) for #XBAD. These steering lines specify the areas of store to be printed

Examples

```
XBADJD  DUMP5,E,!A TESTPRINT                (no steering lines)
XBADJD  DUMP4,E,*CRSTEERFILE                (steering lines in file STEERFILE)
XBADJD  DUMP3,!ANALYSIS ONLY,NOPRINT        (no steering lines)
```

The steering lines for the second example above are:

Steering line	*Meaning*
0-1000	Print words 0 to 1000
2000-P23	Print from word 2000 to the end of page 23
P50-E	Print from the start of page 50 to the end of the file
****	Terminate

A full explanation of steering lines is given in section 5.2.2.3.

5.2.2 Running the programs under MPOE

5.2.2.1 *#XBAA*

Program #XBAA has two entry points for 7904 systems:

20 One-book dump specifying old and new generation numbers of POST7905FILE

21 One-book dump specifying new generation number of LIBY7905FILE

The following are examples of the appropriate commands (in each case, *n* is the required generation number and indented lines show the system response):

Example 1

```
GO #XBAA 21
 #XBAA  HALT : NEW GENERATION TO XO PLEASE
AL #XBAA 0 n
GO #XBAA
 #XBAA HALT : PROC OFF. LPL TO PROC Y. PRESS DUMP
GO #XBAA
```

Example 2

```
GO #XBAA 20
 #XBAA HALT : OLD GENERATION TO X0 PLEASE
AL #XBAA 0 n
GO #XBAA
 #XBAA HALT : NEW GENERATION TO X0 PLEASE
AL #XBAA 0 n
GO #XBAA
 #XBAA HALT : PROC OFF.LPL TO PROC Y. PRESS DUMP
GO #XBAA
```

5.2.2.2 *#XBAB*

Program #XBAB has one entry point for 7904 systems:

20 One book loaded from LIBY7905FILE(*n*)

Example

```
GO #XBAB 20
 #XBAB HALT : INPUT GENERATION TO X0 PLEASE
AL #XBAB 0 n
GO #XBAB
 #XBAB HALT : OK
GO #XBAB
```

5.2.2.3 *#XBAC*

Program #XBAC has two entry points for 7904 systems:

20 One book print of whole dump in POST7905FILE(*n*)

21 One book print of specified areas of dump in POST7905FILE(*n*)

Example

```
GO #XBAC 20
   #XBAC HALT : INPUT GEN TO X0
AL #XBAC 0 n
GO #XBAC
```

When specifying areas of a dump, parameters are given on a card reader. Each card specifies an area to be printed, and the cards are terminated by a card of four asterisks. Areas are specified in the form

m-n

where *m* and *n* are either an integer (word address), an integer preceded by the letter 'P' (page address), or the letter 'E' (end of dump).

Example

0-1000	Print words 0 to 1000
2000-P23	Print from word 2000 to the end of page 23
P50-E	Print from the start of page 50 to the end
****	Terminate

5.2.2.4 *#XBAD*

#XBAD has two entry points for 7904 systems:

20 Produces an analysis print of the dump in POST7905FILE(*n*)

21 As for 20 but with checking of control block addresses suppressed

Example

```
GO #XBAD 20
   #XBAD HALT : INPUT GEN TO X0
AL #XBAD 0 n
GO #XBAD
```

The 7904 loading procedure is identical for both GEORGE and MPOE environments, and the same applies to the procedure for taking a post mortem dump.

When loading under GEORGE 3, no two programs may use the LPL at any one time, so the mainframe should be MOPped OFF.

6.1 Loading the 7904

The 7904 can be loaded using one of two utilities, LPLBOOT or LPLLOAD.

6.1.1 LPLBOOT utility

To load the 7904 using LPLBOOT, proceed as follows:

1 (a) Follow the power-on procedure given in section 1.8.1 or 1.8.2, as appropriate
(b) Check the following:
(i) the status of the unit at the mainframe is RIGHTed and NOT ONLINEd. Under GEORGE 3/4, the unit should also be MOPped OFF
(ii) the CMX (on a 7904/21 or 7904/22) is switched off (on 7904/23 systems, the equivalent CCU does not have to be switched off)

2 Check the following:
(a) The 7904 store is switched on
(b) The LPL is powered up, with the PROC switch at X and the ENG switch at NORM

3 Insert a PAGE 3 Maxiloader tape (provided as part of the software release) in the 7961 Paper Tape Reader and close the latch

4 (a) Switch on the paper tape reader. The ON indicator will be illuminated
(b) Switch the tape reader off-line

5 (a) Power the processor off
(b) Press and release the LOAD switch of the ROM
(c) Power the processor on. The power indicator will flash for a few seconds before assuming a steady condition, indicating that the processor is operable

6 (a) Switch the tape reader on-line. The tape will read in and stop at the end
(b) Switch the tape reader off-line

7 (a) Insert a tape containing LPLBOOT in the paper tape reader
(b) Close the latch
(c) Switch the tape reader on-line. The tape will then be read in

8 At the end of the tape, switch the reader off-line and on-line again

9 Switch the reader off-line and open the latch

10 Depress and release the LOAD switch on the LPL

11 Run #XBAB in the mainframe (see section 5.2.1.2 or 5.2.2.2 as appropriate)

12 For details of subsequent action, see section 6.1.3

6.1.2 LPLLOAD utility

To load the 7904 from the mainframe using the LPLLOAD utility, proceed as follows:

1 (a) Follow the power-on procedure given in section 1.8.1 or 1.8.2 as appropriate
(b) Check that the status of the unit at the mainframe is RIGHTed, not ONLINE, and MOPped OFF

2 Check the following:
(a) The 7904 store is switched on
(b) The CMX is off
(c) The LPL is powered on, with the PROC switch at X and the ENG switch at NORM

3 (a) Load the 7961 Tape Reader with the LPLLOAD 01/R tape combined with a PAGE 3 Maxiloader tape (provided as part of the software release)

(b) Switch on the tape reader. The ON indicator on the front of the reader will be illuminated. Switch the reader off-line

4 (a) Power the processor off

(b) Depress and release the LOAD switch of the ROM

(c) Power the processor on. The power indicator will flash for a few seconds before assuming a steady condition, indicating that the processor is operable

5 (a) Switch the tape reader on-line. The tape will read in and stop at the end

(b) Switch the reader off-line and open the latch

6 Check that the BOOTSTRAP light is on and that the 7904 executive teletype has output an LPL loading message or a retry message

7 Run #XBAB in the mainframe (see section 5.2.1.2 or 5.2.2.2 as appropriate)

8 For details of subsequent action, see section 6.1.3

6.1.3 Completing the loading procedure

1 (a) In each case (LPLBOOT and LPLLOAD), the load should now proceed. At the end of the load, the system identity message will appear on the 7904 executive console, for example:

7904 COS ISSUE *nnn*
MOP SYSTEM MK2 09/01/79

An additional message is displayed by the message-buffering application program:

TKEY/*version no* R

(b) If the load has failed, and the instructions in sections 6.1.1 or 6.1.2 have been followed exactly, attempt the load again. If this fails, engineering assistance should be sought

2 After the system identity message has appeared, the CMX can be switched on (7904/21 and 7904/22 only; on a 7904/23, the equivalent CCU does not have to be switched on)

6.1.4 Setting the date and time

On a 7904 system connected to a 1900 running under GEORGE 3/4, the date and time functions are handled by GEORGE.

On a 7904 connected to allow running under MPOE, the clock must be initialised after the 7904 is loaded, and the time of day must be set. The clock will not start operating until it is initialised; this is done by the DATE command, which can also be used subsequently to correct the clock if necessary. The DATE and TIME commands are described in section 7.2.2.

6.2 Taking a post mortem dump

To take a post mortem of a 7904, proceed as follows (Note: Each input on the 7904 console is terminated by the carriage return character):

1 Ensure that the 7904 is in a post mortem state. If the system has failed, a system error message will have been output and the machine will be in the correct state. Otherwise, obtain the post mortem state as follows:

(a) Type

X-ON (CTRL together with Q)

on the 7904 executive console. The system will respond with the prompt <>

(b) Type one of the following:

(i) POST

(ii) POST : *comment*

when *comment* is a string of up to 80 characters, which will be printed at the top of the post mortem listing, and can be used to identify the reason for the dump

(c) If typing X-ON fails to give a prompt, press the STORE REJECT switch on the front of the 7904 store. The machine will then assume the post mortem state

2 When the 7904 is in the post mortem state, check at the mainframe that the 7904 is MOPped OFF, RIGHTed and NOT ONLINEd. If it is necessary to MOP OFF, the PM parameter to that command should be given

3 Press the DUMP switch on the LPL. The BOOTSTRAP indicator will be illuminated

4 Run program #XBAA at the mainframe. The BOOTSTRAP indicator will be extinguished when the dump is complete

Information on running #XBAA under GEORGE 3/4 is given in section 5.2.1.1, and under MPOE in section 5.2.2.1.

Console messages and operator commands **Chapter 7**

This chapter describes the various messages that may be displayed on the 7904 executive console (section 7.1), and also the commands that are available to the operator (section 7.2). Section 7.3 describes switching to a standby line when the normal line has failed

7.1 Console messages

Console messages fall into three groups:

1 Parent link status
2 Display messages
3 System errors

7.1.1 Parent link status messages

These messages indicate the state of the link to the mainframe, and have the following form:

<> PARENT LINK: *status*

where *status* is one of the following:

OPENED	Indicates that the 7904 has been connected to the mainframe. All configured terminals can communicate with the parent processor
CLOSED	Indicates that the 7904 has been disconnected from the mainframe. No terminal can access the mainframe, although the 7904 will acknowledge attempted input from terminals by sending the response LINE CLOSED
INOP	An inoperable condition has been detected on the LPL
TIME OUT	The mainframe has failed to read from the 7904 for the duration of its time-out period (21 seconds)

After having output message type 3 or 4, the 7904 will force the link status to CLOSED and message 2 will be output (although the 7904 will still be connected to the mainframe).

7.1.2 Display messages

Messages sent for display on the 7904 console are of two types:

1 Date and Time – frequency is determined by GEORGE 3 installation parameter "DATE"
2 "IDENTIFIER *n* HAS BECOME INOPERABLE" whenever a device connected to the 7904 has become inoperable

For systems using 1900 Communications Manager, certain other messages can also be output. When Communications Manager has successfully allotted and initialised a 7904 controller, it displays the following message on the 7904 console:

ALLOTTED BY CM AT *time* ON *date*
When it is about to release the controller it displays
RELEASED BY CM AT *time* ON *date*

7.1.3 *System error messages*

These messages are output whenever there has been a hardware or software rejection. There are five messages, all with the following format:

SYSTEM ERROR *type* AT *address*

where

type is one of the following:

A Executive crash
B Store rejection (normal state)
C Store rejection (special state)
D Violation (special state)
E Violation (normal state)

address indicates the store location (relative to the segment base) of the current instruction

Crashes of type B or type C indicate that the processor has been unable to access a certain store address, and are rarely attributable to software causes. In the event of one of these crashes the following action is recommended:

1 Check the 7904 store for parity failure indication

2 Check that the store is switched on and on-line

If these checks reveal nothing wrong, a post mortem dump should be taken and the machine reloaded. If the machine fails shortly after reloading the engineer should be called.

Crashes of types A, D or E normally occur because of software errors. The recommended action is to take a post mortem and proceed as in the previous paragraph.

7.2 Operator commands

The operator commands available are described in this section.

7.2.1 READ command

This command is used to read store locations. The format is:

<>READ:*address,number*

where

address is a one- to five-digit decimal specifying a store location. There is no check made on its validity

number is an optional one-digit decimal (default 1) specifying the number of consecutive store locations to be printed

The values output are a signed decimal number followed by its hexadecimal equivalent, one store location per line. Output may be terminated by typing X-ON (CTRL together with Q) in which case the prompt is not repeated. No carriage return is done when the list is completed.

7.2.2 DATE and TIME commands

These commands are used to input the date and time to a system running under MPOE. GEORGE 3/4 systems have the date and time set by GEORGE.

To use these commands proceed as follows:

1 Type X-ON (CRL together with Q). The system will reply with the prompt <>

2 Type the date as follows:

DATE: *dd,mm,yy*

Note: *yy* is the last two digits of the year, for example 79 for 1979.

The system will respond with a further prompt <>

3 Type the time as follows:

TIME: *hh,mm*

where

hh is the hour on a twenty-four hour clock, in the range 0 to 23
mm is the minute, in the range 0 to 59

Accuracy can be obtained locally by typing the terminating character (carriage return) as the local time source passes the minute.

Note: The clock assumes that the time input is the start of the minute, not the end.

7.2.2.1 *Example*

X-ON
<> DATE: 23,5,79
<> TIME: 9,7

This will set the internal date and time variables to 9.07 a.m. on 23rd May 1979, and the clock will now start maintaining time of day.

7.2.2.2 *Error message*

The message

SYNTAX?

is displayed if the values input are not within the expected ranges, namely:

Day	1 to 31
Month	1 to 12
Year	0 to 99
Hour	0 to 23
Minute	0 to 59

7.2.2.3 *Comments*

Time of day is maintained by the system's interval timer. The date is incremented automatically at midnight (defined as 23:59:59), including going on to the next month and year.

7.3 Switching to standby

If the communications line fails, communication with the mainframe can be switched to a public telephone line by the following procedure:

1 Establish the standby telephone connection with the remote terminal

2 Select standby working at the remote terminal and switch to Data at the remote end of the link

3 Type X-ON (CTRL together with Q) on the 7904 console and in response to the prompt <> type the following command, without embedded spaces and terminating with a carriage return:

LL:*line,mode*

line is a decimal number indicating the line to be switched

mode is one of the following:

SF Selects the high standby line speed (1200 bps)
SS Selects the low standby line speed (600 bps)
N Reverts to the speed of normal working

Note: If the MSS, CCU or CMX is reset or switched off and on, the line will automatically revert to normal working

4 Switch to Data at the 7904 end of the link. The line is then available to be connected to a leased or dialled line

If the LL command fails, the following error message will be displayed on the 7904 executive console:

STANDBY FAIL 9A*xx*

where

xx is one of the following:

58 A line mode file cannot be obtained to control the line

6A The line is not configured

8B The line is not working in synchronous mode

90 The mode reset command has failed

8.1 Description of Error Manager

The Error Manager facility is included in 7904 software, and is a means of recording the occurrence of hardware errors to assist the engineers in maintaining communications equipment. If a transfer fails or (where applicable) requires one or more retries, the line service routine responsible for the transfer will trap this failure and send information about it to the Error Manager activity. The Error Manager activity collects this information and transmits it to the parent mainframe. For this purpose Error Manager simulates a 7020 card reader and, for each reported error, transmits to the mainframe one card image containing the relevant information. This information can subsequently be processed in the parent machine for inspection and analysis. Thus faulty hardware can be readily identified, easing the task of maintenance.

Information from Error Manager can be recorded and (optionally) analysed by the engineer's program #RSJC.

Error Manager is at present only supported for machines connected via an LPL to a parent running under the GEORGE 3 (or 4) operating system.

For 7904 standard systems, Error Manager provides the EMU command (described below), and a set of console messages (described in section 8.2).

The EMU command causes the archiving program to be run in the present processor. The format of this command is:

X-ON(CTRL together with Q)
<> EMU

followed by the carriage return as terminator.

8.2 Error Manager console messages

Error Manager responds to the EMU command with a console message. If the command is successful this will be:

<> DEV EMI ARCHIVE

If the command is unsuccessful the message will be either

<>DEV EM1 MATERIAL

which indicates that no errors have been detected since the last archive, or

<> DEV EM1 FAIL 009*n*

where

n=0 indicates that archiving is already in progress and
n=1 indicates that Error Manager is not active

By default, Error Manager will initiate archiving after eight hours continuous running or two thousand detected errors. Prior to MOP-OFF, the EMU command (see above) should be given to ensure that all detected errors are reported to the mainframe.

The other console messages fall into two classes:

1 Messages indicating the state of Error Manager's link with the parent processor. These are:
<> DEV EM1 OPERABLE
indicating that Error Manager has been activated, and
<> DEV EM1 INOP
indicating that Error Manager has been deactivated. These messages appear at MOP-ON and MOP-OFF respectively

2 Messages indicating failures of communications transfers:
<> DEV *typenumber direction* FAIL ON *nnss*
where
type indicates the device that has failed:

MX The Communications Multiplexer (CMX)
CL The Command Chain Unit (CCU)
LL The Local Processor Link (LPL)

number is the number of the above device
direction indicates the direction of transfer:

IP Input
OP Output

nn is the line or port number
ss is the contents (hexadecimal characters) of the Channel Status Register (CSR)

The contents of the CSR have the following significance:

Contents	*Meaning*	*Comment*
10	Channel operable	Channel modem has become operable while channel is inactive
11	Scanner switch-on	Occurs after general reset in scanner due to Power on transmission of MCDI status character/scanner reset
12	Channel inoperable	Channel modem has become inoperable while channel is inactive
14	Break-in	Break-in has been detected while channel is inactive
18	Time out	Attempt at connecting modem on-line has failed
2*x*	Good terminate status	*x* if non-zero represents a special comparator character, where specified, otherwise *x* is zero
60	Semi-terminate status	Detection of block checking characters when reading from device
80	Break-in	Break-in has been detected while writing to device
81	Not serviced	Read or write data request not serviced in time
82	Line error	Data error detected while reading from device
83	Time out	Character or mark time out has occurred while reading from device
86	Modem error	Failure of modem interchange circuit (not DSR)
87	Line inoperable	Modem becomes inoperable while reading from or writing to device
88	Links not loaded	A channel command has been issued to a channel before the links have been loaded
89	Illegal command	An illegal command sequence has been initiated by the CCU
8A	Parity error	Parity error detected by scanner during transfer between scanner and CCU

Example

<> DEV CL6 IP FAIL ON 038A

indicates that the CCU connected to processor port 6 has detected a parity failure while attempting an input transfer on line 3

8.3 Error information

Each error reported to the mainframe will contain the following information:

1 The date and time of the occurrence of the error
2 The error type
3 The 7904 identifier – this is always 1 except where more than one 7904 is reporting errors to the same mainframe

In addition each report will contain information specific to its type. This information is primarily

of interest to the ICL service engineer. For example, multiplexer and CCU error reports contain the channel and line number; LPL error reports contain such items as the LPL identifier and the file type string.

All communications error reports will contain the retry limit for the stream and the retry count.

Local peripheral errors will give the operation in progress, the device status, the physical medium identifier (PMI) and the physical peripheral identifier (PPI).

Timeout failures on VDUs and teletypewriters are not passed to the Error Manager activity, so no record of these will appear. Similarly timeouts occurring on XBM lines before a successful group reset will not appear.

Appendix 1

All the facilities listed in this publication will be available with the first release of 7904 software, except in the area listed below. This facility will be available in a future software release.

Section	*Facility*
6.1.2	LPLLOAD utility

The messages below are those that can be output at the mainframe by the programs #XBAA to #XBAG following a program halt.

A2.1 #XBAA (Dump)

Message	*Meaning*
AB	End of (failed) run
DISC FILE NOT ONLINE	
DS	LPL dump switch not set
ERROR CODE *xx* ON *yyy*	
LL	Allot LPL fails
LPL IS INOPERABLE	
OK	End of successful run
OLD GENERATION TO X0 PLEASE	Specify old generation number of POST7905FILE in location 0
NEW GENERATION TO X0 PLEASE	Specify new generation number of LIBY7905FILE or POST7905FILE in location 0

A2.2 #XBAB (Load)

Message	*Meaning*
AB	End of (failed) run
DATE RECORD MISSING	Specify the date and time (see section 7.2.2)
EDS FILE EMPTY	
EDS FILE NOT ON-LINE	
ERROR CODE *xx* ON *yyy*	
INPUT GENERATION TO X0 PLEASE	Alter location 0 to contain current file generation number of LIBY7905FILE
LL	Allot LPL fails
LPL INOPERABLE	
LS	LOAD switch on LPL not set
OK	End of successful run
TRANSFER REJECTED	Possibly due to insufficient store being specified

A2.3 #XBAC (Print dump)

Message	*Meaning*
AB	End of (failed) run
CARD INVALID	
CARD NOT PROCESSED	
CR	Allocate card reader
DISC FILE NOT ON-LINE	
EDS FILE EMPTY	
ERROR CODE *xx* ON *yyy*	
INPUT GEN TO X0	Alter location 0 to the required file generation number

Message	*Meaning*
INVALID FIRST RECORD ON EDS FILE	
LP	Allocate line printer
OK	End of successful run
PL	Paper low
PRINTER REQUIRES ATTENTION	
TE	Program run terminated by operator

A2.4 #XBAD (Analyse dump)

Message	*Meaning*
CP	Allocate card punch
DA	Failure to open disc file
ED	Failure to read disc file
INPUT GENERATION TO X0	Alter location 0 to the required file generation number of POST7905FILE
LP	Allocate line printer
OK	End of successful run

A2.5 #XBAE (Patch selector)

Message	*Meaning*
filename DOES NOT EXIST	No file found with name *filename*
FAILED IN #XBAE	End of (failed) run
PATCHING SUCCESSFUL	XBAEJD macro executed successfully

A2.6 #XBAF (Assembler)

Message	*Meaning*
ASSEMBLY ERRORS	Software error report should be raised
DEAD	Insufficient core specified
ERRORS	Errors in Specification File records
FAILED IN #XBAF	End of (failed) run
PROGRAM #XBAF FAILURE	XBAEJD macro has failed to execute successfully

A2.7 #XBAG (NCP)

Message	*Meaning*
AA	Failure to read from Template File
ASSEMBLY ERRORS	Software error report should be raised
BB	Failure to write to Source File
CC	Failure to read from COS/Turnkey Master File
CP	Failure to open card punch
CQ	Failure to write to card punch
CR	Failure to open card reader
DD	Failure to write to System File
EE	Failure to open COS Master File
FF	Failure to open System File

Message	*Meaning*
GG	Failure to open Templates File
INSUFFICIENT CORE GIVEN	Not enough core specified in appropriate parameter of XBAGJD macro
JJ	Failure to read filename of System File
KK	Failure to create new System File
LL	Failure to extend System File
LP	Failure to open line printer
MM	Failure to open Turnkey Master File
NN	Failure to open Options File
PP	Failure to open Source File
PT	Failure to write to line printer
RE	Failure to read from card reader
RR	Failure to contract System File
RUN COMPLETED OK	XBAGJD macro executed successfully
SS	Failure to close and delete System File

An example of a Specification File is given below, followed by information on errors resulting from incorrectly-specified records in the file.

A3.1 Example of Specification File

The following example of a Specification File illustrates the various commands that can be used. Comments on some of the records are given at the end of this section.

```
0   ++
1   ++
2   ++ MOP SYSTEM SPEC FILE
3   ++
4   NAME,MOP SYSTEM MK 2
5   SIZE,56K
6   SCAN,M16
7   EM,I110
8   XPW,L6,A22,I1,S4800
9   XLP,L6,A60,I2
10  XCR,L6,A61,I3
11  ++
12  PW,L7,A20,I5,S4800
13  CR,L7,I6
14  TR,L7,I7
15  TP,L7,I8
16  LP,L7,I9
17  ++
18  TELE,L5,I20,A24
19  XVC,L5,I21,A30
20  HCP,L5,I25,A50
21  VSI,L5,I28,A2E
22  VSO,L5,I27,A2F
23  ++
24  VC,L0,150,A32,S4800
25  VC,L2,I52,A36
26  VC,L4,I60,A24,Q20
27  TW,L16,I70,S300
28  TW,L24,I78,S300,AA
29  ****
```

The comments below explain the significance of some of the records in this example. Record numbers are included for reference and do not form part of the record itself.

Record	*Comments*
0	Records beginning with a + character are treated as comment lines and are ignored. Comment lines with no text can be used as separators to improve the layout of the file.
4	The name MOP SYSTEM MK 2 will be included in the system identity message whenever this appears on the console
5	This defines the store size of the 7904 as 56K
6	Defines an MSS with 16 channels
7	This record defines the error manager stream (from which communication errors are reported to the mainframe) to have the identifier 110
8	Indicates a console connected via an XBM link, with a line number of 6, a (hexadecimal) polling address of 22, a parent identifier number of 1, and a line speed of 4800 bps
26	The last parameter in this record indicates that the 7181 video console defined is connected via a QLSA with the (hexadecimal) address 20
28	The last parameter of this record indicates that auto-answer is supported

A3.2 Specification File error messages

On recognising an incorrectly-specified command record in the Specification File, the system outputs an error message of the format shown in section 3.2.2. Explanations of these messages are given below, arranged according to the commands that generated the messages.

Command	*Message*	*Comment*
Any	INVALID COMMAND	
NAME	NO SYSTEM NAME	System name not supplied
SIZE	INVALID STORE SIZE	Must be 48 or 56
	K?	Must terminate with K
	NO STORE SIZE	Store size omitted
SCAN	MUST DEFINE SCANNERS FIRST	
	SCANNER LINES INVALID	Must be multiples of 16
	SCANNER ON CMX	COS Master File is based on CMX, not CCU
	SCANNER TYPE	Must be M or L
	SCANNERS ALREADY DEFINED	
Device (for example, VC, TW)	DUPLICATED DEVICE	RJE device repeated on same line
	NO DEVICES	No devices, recognised in configuration
	REQUIRED DEVICE NOT SUPPORTED	Device software set not licensed in COS Master File
	TOO MANY XBM CLUSTERS ON LINE	Only one cluster per line supported
A	DUPLICATE ADDRESS ON LINE	
I	DUPLICATE IDENTIFIER	
	INVALID IDENTIFIER	Must be in range 1 to 4095
	IDEN RANGE 255	Range from highest to lowest identifier is 255 maximum
L	LINE ALREADY ALLOCATED	
	LINE NOT ON SCANNER	
	LINE TOO HIGH FOR CMX	More than 108 low speed lines specified on CMX
	NO LINE FOR DEVICE	
Q	ADDRESS OVERLAP ON QLSA IDENTIFIER *nn*	Device with identifier *nn* has reserved address specified
S	INVALID SPEED	Must be 100, 110, 300, 600, 1200, 2400, 4800 or 9600
	SPEED ILLEGAL ON LSS	Maximum LSS speed is 300 bps
	SPEED TOO FAST	Maximum teletype speed is 1200 bps
	SPEED TOO SLOW	Minimum speed for synchronous lines is 1200 bps
A,C or Q	ADDRESS RANGE ERROR	See Table A3.1.
	INVALID ADDRESS	See Table A3.1
	INVALID PARAMETER	
A,C,I,L,Q or S	DUPLICATE PARAMETER	

Table A3.1
Device addresses

Command	*Device mnemonic*	*Address must be multiple of*	*Address range (inclusive)*
A	PW	8	32 to 120
	VC	2	32 to 126
	Mnemonic of XBM device	1	34 to 127
C	VC	4	32 to 124
	Mnemonic of XBM	8	32 to 96

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Page checklist

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1–16	0	A3–1	0
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2–10	0		
3–1	0		
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3–4	0		
3–5	0		
4–1	0		

Amendment Record

Should any additions or amendments to this Manual be necessary, they will be issued in the form of Amendment Lists.
When such changes have been incorporated, an appropriate entry should be made in the table below and the pink instruction sheet(s) should be filed at the back of this publication.

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