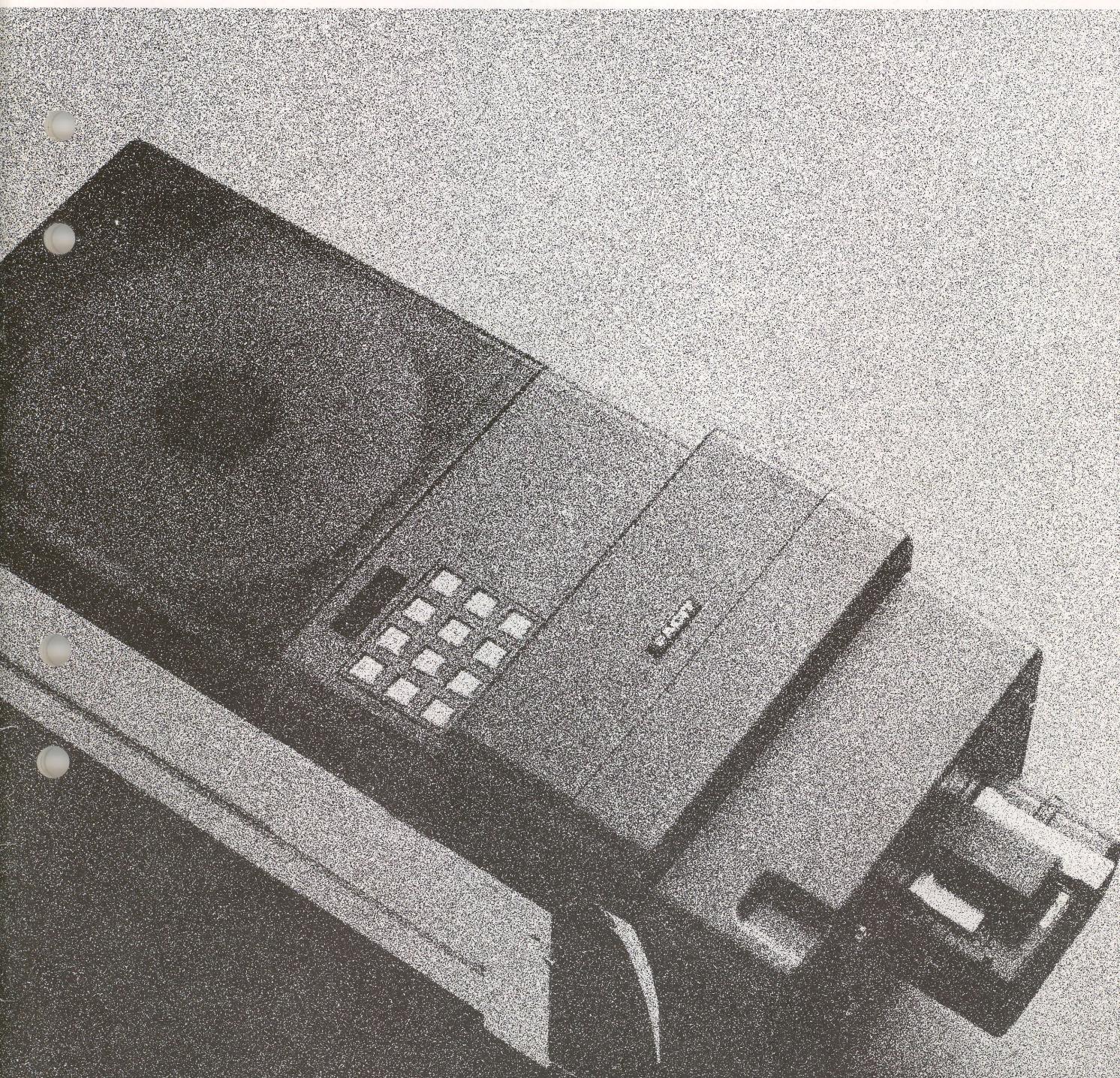


Facit 4046/4047

Punch/Reader-Punch

Technical description

Edition 3



FACIT

SCOPE OF THE MANUAL

This document describes both the Facit 4046 punch and the Facit 4047 Reader/Punch Combination. It includes detailed operating information, interconnection details and interfacing

requirements to external equipment. This document does not include detailed circuit diagrams or circuit descriptions, and does not include software descriptions or servicing information.

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1. INTRODUCTION

The Facit 4046 is a paper tape punch for punching 5 to 8 track tapes. Five track is normally used to punch teletapes and 8-track mostly for punching NC-programs. The punching speed is 60 characters per second.

The Facit 4047 is a reader/punch combination. It can read and punch 5 to 8 track tapes. The punching speed is 60 characters per second and the reading speed is 120 characters per second.

Both units are designed as stand alone units for table top mounting. Two standard I/O ports are available with CCITT V 24/RS-232-C serial interface.

Facit 4046/4047 has a buffer of 3.5 K capacity. The buffer can be shared between the two I/O ports.

Code conversion can be performed. The codes included are the two used NC codes ISO and EIA and the national versions of the telexcode.

A small keyboard and status display are incorporated at the top of the unit; with this all operating system parameters may be quickly and easily entered with no necessity to change pc board DIP switch settings. The status display clearly indicates the unit's current operating status, and also shows simple error messages.

FCC Class A Computing Device: Information to User

WARNING

This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference, in which case the user at his own expense will be required to take whatever measures may be necessary to correct the interference.

Caution

Compliance with FCC regulations on Radiated Emissions (RFI) requires use of a shielded peripheral-to-host cable.

2. DESIGN AND CONSTRUCTION

2.1 Brief Description

The Facit 4046 is shown in fig. 1. The blank tape is contained on a standard spool at the top rear of the unit, with the tape feed and punch mechanism housed under a cover towards the front of the machine. A semi-transparent lid covers the tape spool during normal operation, and the amount of tape left on the spool can easily be seen without raising the lid.

The punched tape emerges from the exit slot at the left of the unit; no special arrangement is included for handling the punched tape.

A tape cutter is fitted in the punched tape exit slot. The tape is torn off against this cutter to leave a 'V' at the end of the tape; this enables the start and finish of the tape to be correctly identified.

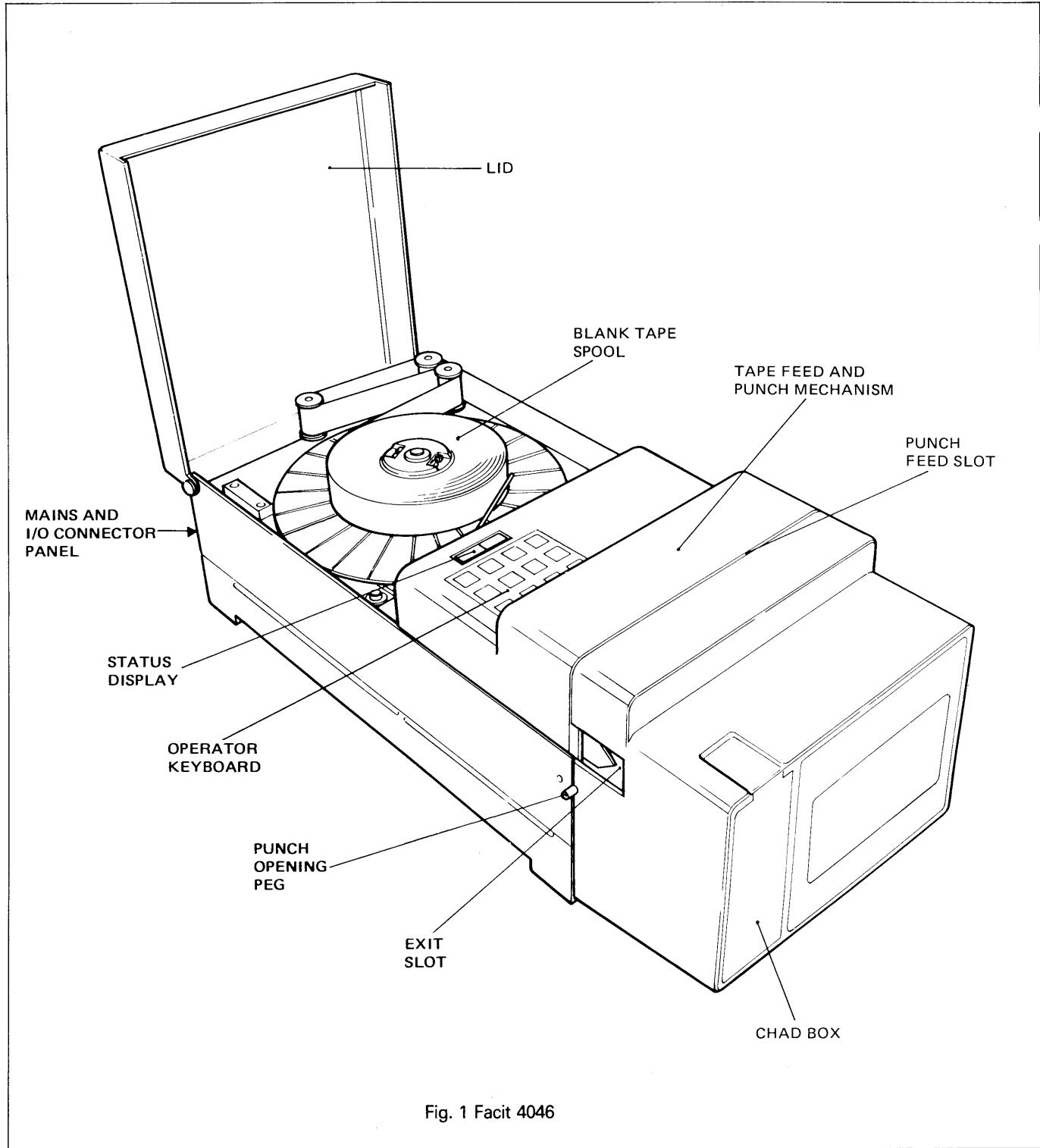


Fig. 1 Facit 4046

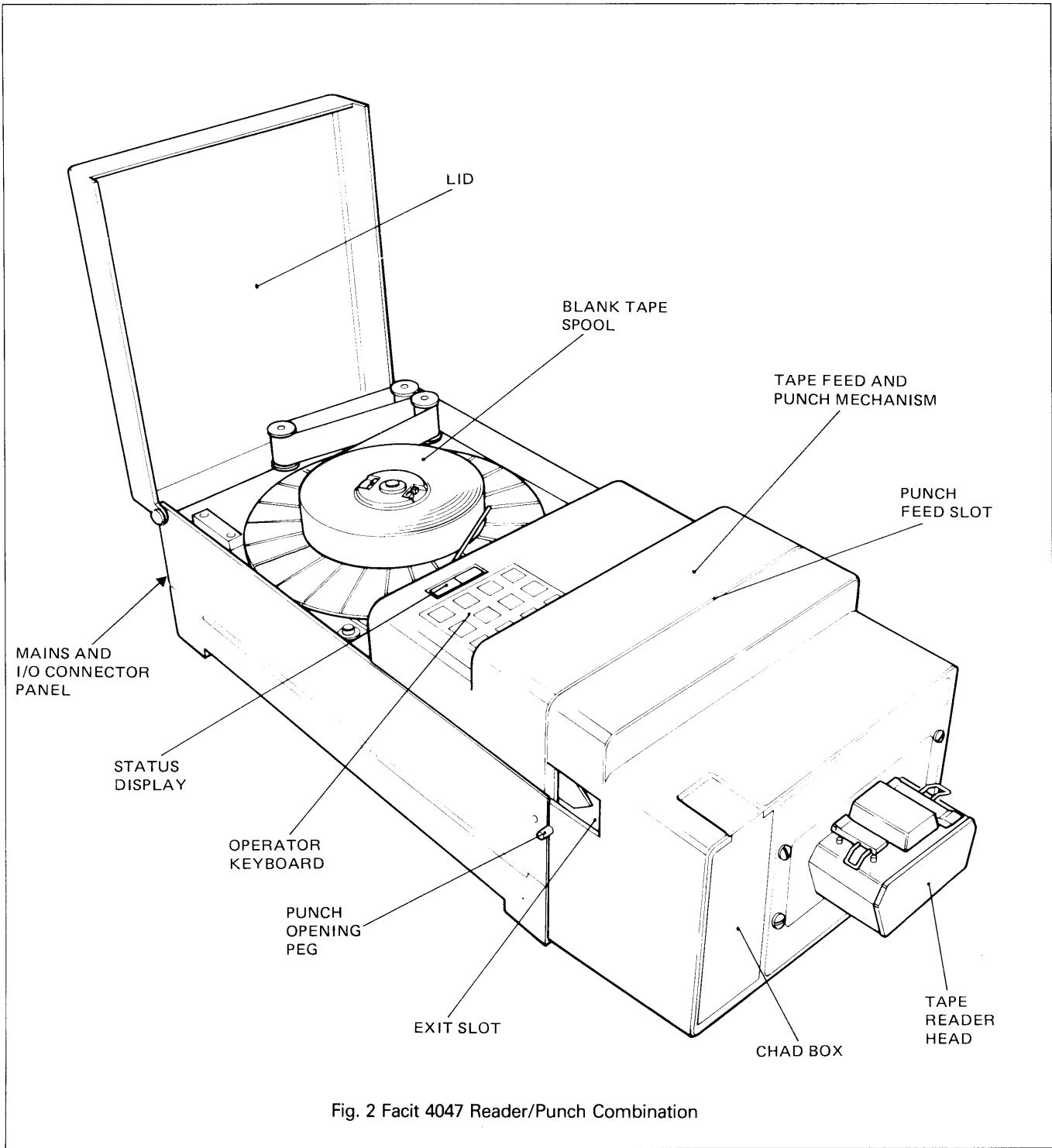


Fig. 2 Facit 4047 Reader/Punch Combination

The chad box is located at the front left of the unit and may be removed by pulling it out from the top.

The operator's keyboard and status display are situated on top of the unit in front of the lid.

The mains ON/OFF switch, supply fuses and I/O connectors are fitted on the rear panel of the unit.

The Facit 4047 Reader/Punch Combination is shown in fig. 2. The reader head is mounted at the front of the unit next to the chad box.

2.2 Punch Tape Handling

The tape path through the punch is shown in fig. 3. The blank tape leaves the spool and passes around a pulley on the tape guide arm. The guide arm applies a progressively acting brake which operates on the tape bobbin. This operates to ensure that tape fed through the punch is maintained at a constant tension to ensure accuracy and consistency of punching.

Tape Low and Tape End

When the punch tape supply is low, the error message 'Lo'

appears in the display. When the tape is exhausted, or if a jam occurs in the feed mechanism, the message 'Err' blinks on and off in the display.

2.3 Punch Tape Loading

With mains power switched OFF, load tape onto the punch tape holder as follows (see fig. 3).

- (1) Move the tape guide arm until it touches the magnetic catch. This action applies the brake to the tape bobbin and frees the tape feed and punch mechanism.
- (2) Pull out 2 metres (6 feet) of tape from the new reel and place the reel onto the bobbin.
- (3) Lock the bobbin by pushing the centre section down-

wards by hand as far as possible (see fig. 3).

- (4) Push upwards the two punch opening pegs (located one at each side of the punch housing — see figs. 1 and 2), and pull forward the punch assembly to open the tape feed and punch slot (see fig. 3).
- (5) Lead the tape around the guide pulleys and drop it into the tape feed and punch slot.
- (6) Push back the punch assembly to close the tape feed and punch slot.
- (7) Release the tape guide arm from the magnetic catch.
- (8) Switch the power ON and depress the [FEED] key until the tape is taut, and feeding correctly from the spool.

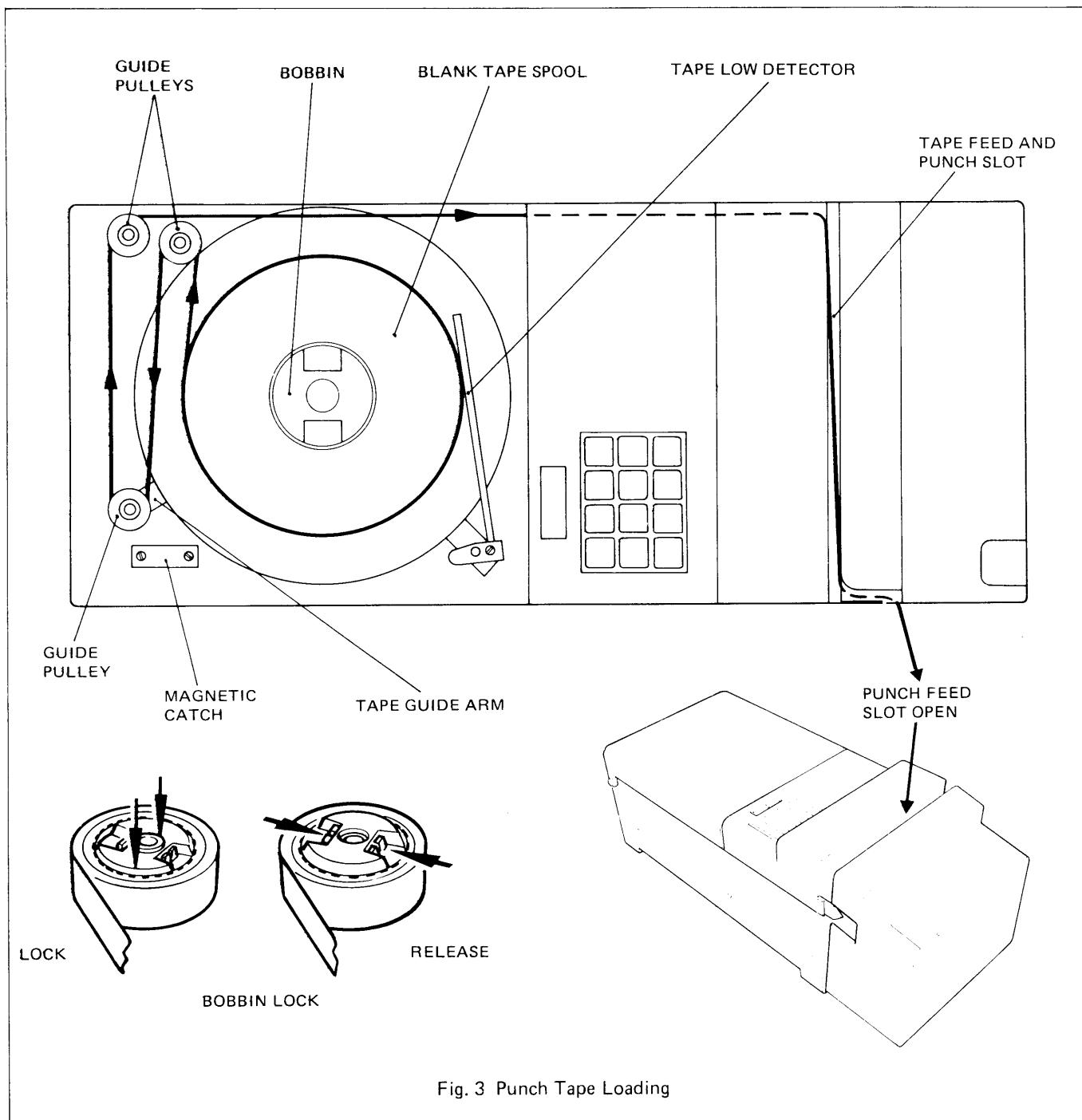


Fig. 3 Punch Tape Loading

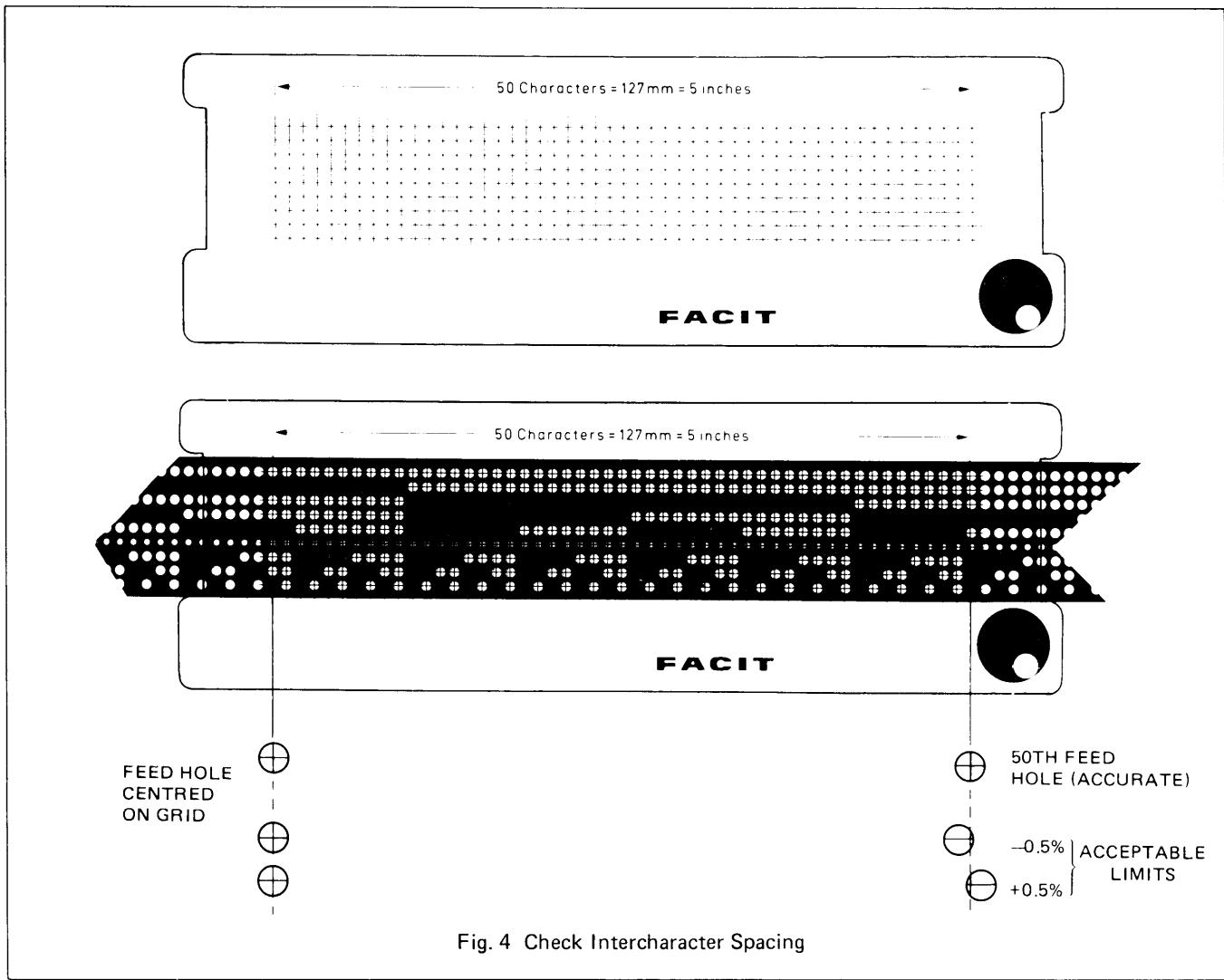


Fig. 4 Check Intercharacter Spacing

2.4 Punching Accuracy

The accuracy of punching can be checked by using the Facit template part no. 1114 00 50-00/0 as shown in fig. 4. It is recommended that this check is carried out approximately every 50th tape reel used.

- (1) Lay the punched tape on the template as shown in fig. 4, with a feed hole accurately centred on the leftmost vertical line.
- (2) Examine the 50th feed hole on the rightmost vertical line. If this line is visible within the hole, (i.e. within $\pm 0.5\%$), the punch accuracy is acceptable.
- (3) If the vertical line is not visible (i.e. outside $\pm 0.5\%$) the punch mechanism requires servicing.

2.5 Reader Tape Handling (Facit 4047 Combination Only)

The tape path through the reader is shown in fig. 5. The tape passes under the entry guide wire, through the tape width selector (adjustable to suit 5, 6/7 and 8 channel tapes), past the reader head and over the drive sprocket. The drive

sprocket teeth engage in the tape feed holes to pull the tape past the head.

An indicator lamp on the reader head is lit to show that the optical reader lamp is on.

The tape can be run quickly through the reader either forwards or backwards, without data being read, by depressing the [FF] or [FB] key respectively.

Reader Error

A malfunction of the tape reader mechanism stops the transmission of data and the message 'Err' blinks on and off in the display.

2.6 Reader Tape Loading (Facit 4047 Combination Only)

Paper tape is loaded into the reader as follows (see fig. 5):

- (1) Raise the lift bar to open the entry and exit guides.
- (2) Put the tape into the reader and over the drive sprocket.
- (3) Lower the lift bar to hold the tape in position; ensure that the tape feed holes are engaged correctly in the drive sprocket.

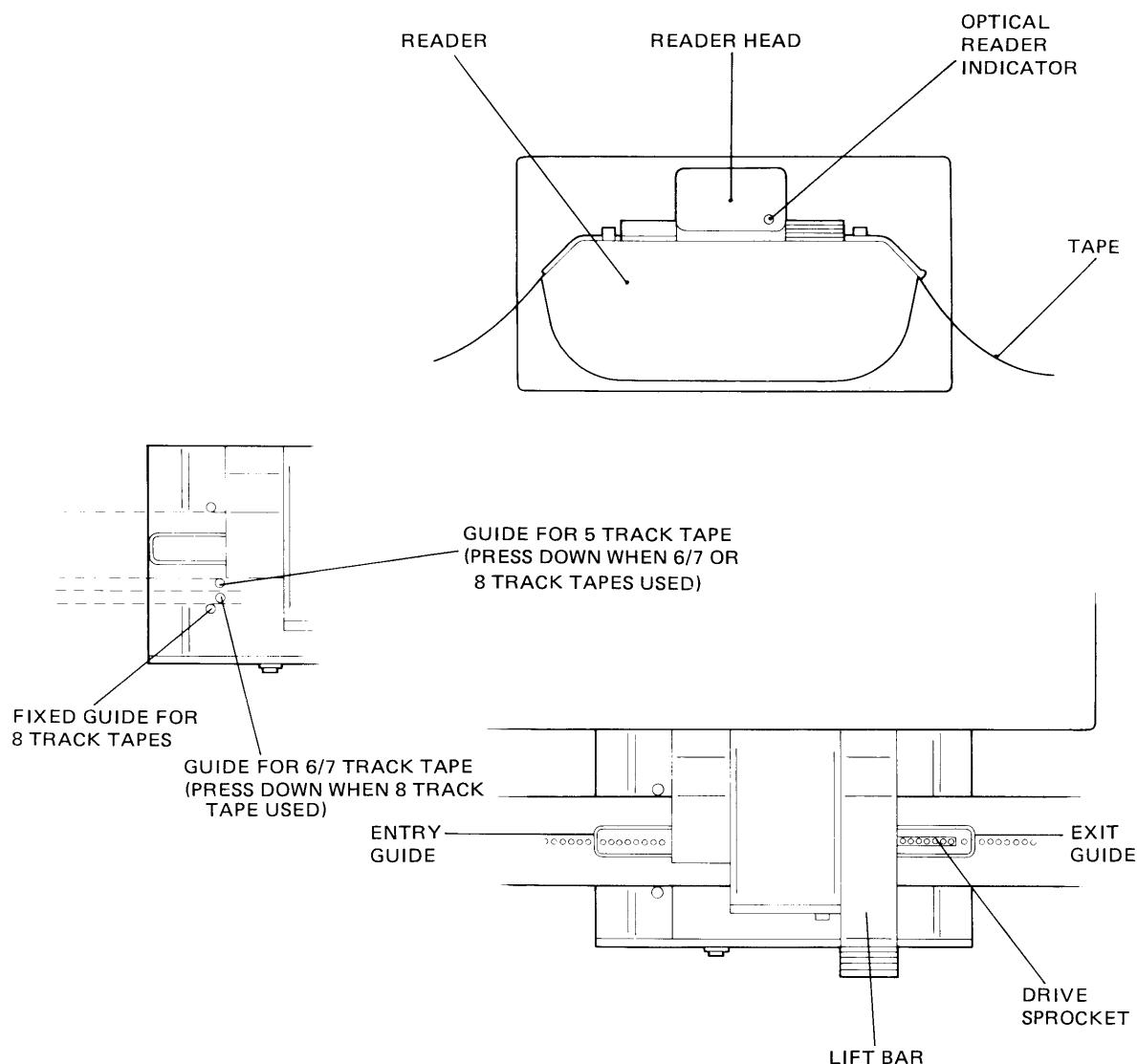


Fig. 5 Reader Tape Handling

3. OPERATION

An overall block diagram of the Facit 4046/4047 is shown in fig. 6.

The unit is intelligent and all programming functions are performed by entries made on the built-in keyboard.

All program parameters are held in RAM, and a battery is incorporated on the interface board to preserve the memory contents when the unit is switched off. The battery capacity is sufficient to retain the memory contents for several years.

3.1 Punch Buffer

The overall operation of the punch, and the control of incoming data, is performed by the buffer. Data can be entered via Channel 1 or Channel 2, or both simultaneously. Whichever channel receives data first, assumes priority over the other.

The buffer's total capacity (3.5 K) is shared between Channels 1 and 2 according to the buffer stop address selected for channel 1, in the Program mode (see section 5). Each 'buffer' accepts data from its source until full; an instruction is then sent to the source to stop transmission (see section 3.3).

The required code conversion of the incoming data is performed prior to reading into the buffer; data in the buffer is therefore always in the correct version for direct punching out.

3.2 Punching Out Data

Whichever channel has assumed priority for incoming data keeps this priority when punching data.

Data transfer from buffer to punch is controlled and selected in the Program mode (see section 5).

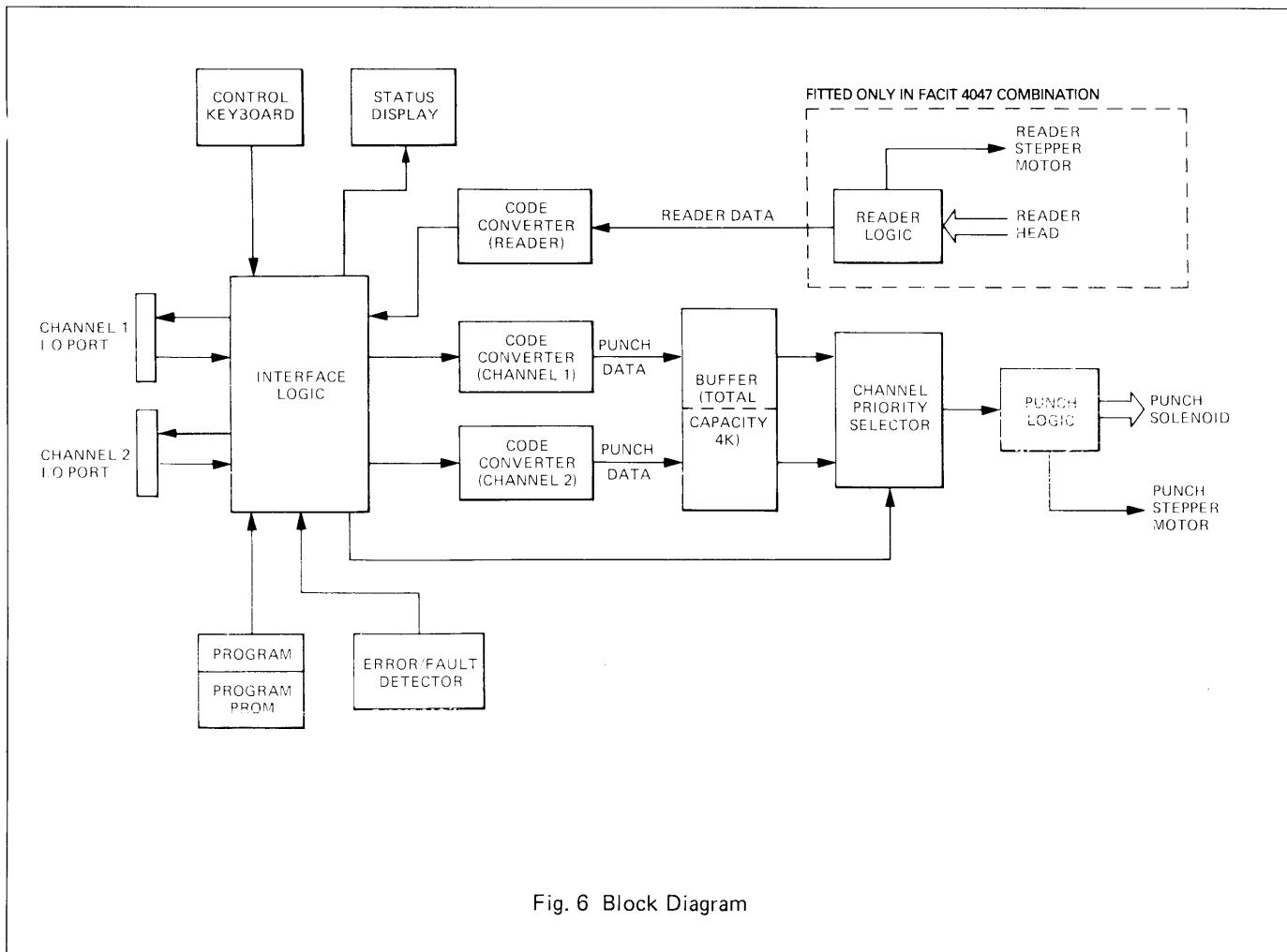


Fig. 6 Block Diagram

3.3 Buffer Status Signalling

The acceptance of incoming data via each channel is controlled separately by the Full or Empty status of its associated part of the buffer.

The buffer Full or Empty condition is indicated either by X-ON/X-OFF protocol or Ready/Busy status signalling, selectable separately for each channel in the Program mode. (See section 5).

3.4 Punch Speed

The punching speed is 60 characters per second.

3.5 Time Out

If data is sent to both channels simultaneously, the channel receiving data first assumes priority and starts punching. An End of Message character or a Time Out selected in program mode (see selection 5) can change priority to the other channel. The Time Out function is explained fully in section 7.3.

3.6 Tape Reader (Facit 4047 reader/punch combination only)

Where a reader is included on the unit, data read from a punched tape is transmitted via channel 1 or channel 2. When the reader is started from the keyboard (start key) data is always transmitted via channel 1. When the reader is started remote, using the start reader code (see table 6, page 16), data can be transmitted via channel 1 or 2 depending on the channel used

to send the start reader code. The channel not affected by reading can accept data for punching.

If reading is attempted while data for punching remains in any of the buffers for channel 1 or 2, readings is inhibited and BUSY is displayed. Reading can start when the existing contents are punched and the channel buffer is empty. Reading takes place at a speed of 120 characters per second.

The reader stops when the Stop key is depressed, a stop reader code is received (either sent over the line or read on the tape), or when the tape end is reached.

The transmission continues until the buffer is empty even if the reader stops due to any of the conditions above. The transmission can be controlled using the XON/XOFF protocol (see table 5, page 15, program mode 3/4). Sending the code DC3 will stop transmission and the code DC1 will start transmission.

Starting the reader with X ON (DC1)

When X ON/OFF protocol is used DC1 will start the reader. DC3 will not stop the reader but the transmission will be stopped. When other mode than transparency mode is used, DC1 (17) must be set in program step 14, start reader, see page 1

When X ON/OFF protocol is not used DC1 and DC3 can be used to start and stop the reader in all modes without transparency mode.

Program step 14, start reader, must be set to 17 and program step 16, stop reader, must be set to 19.

Reader Start with DC1 (XON)

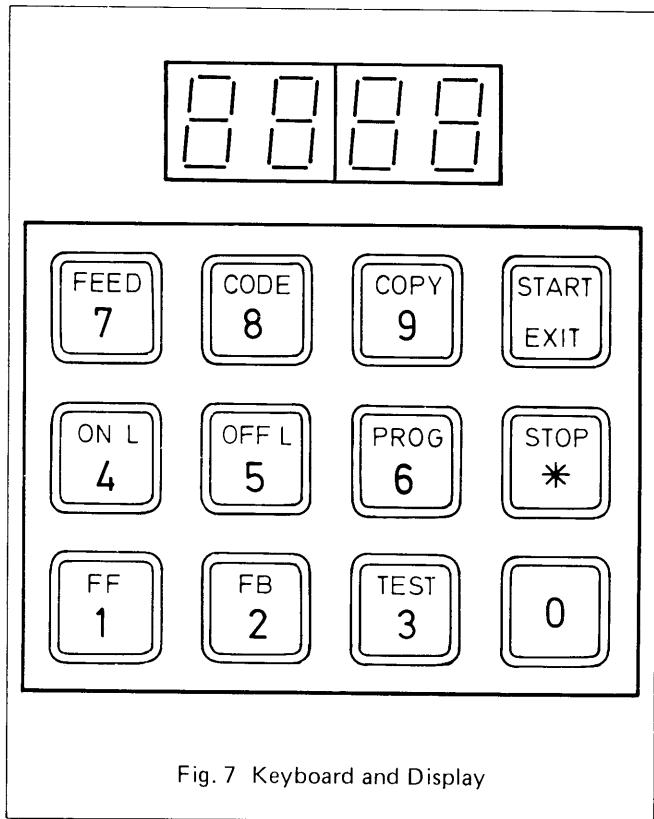
Program Step 3/4	Program Step 6/7	Program Step 9	Program Step 14	Reader Start
2XXX 4XXX	0	0	0	DC1 (XON) starts Reader
2XXX 4XXX	0	≠ 0	0	DC1 (XON) starts Reader
2XXX 4XXX	≠ 0	≠ 0	0	DC1 (XON) does NOT start Reader
2XXX 4XXX	≠ 0	≠ 0	17 (DC1)	DC1 (XON) starts Reader
1XXX 3XXX	0	0	0	DC1 (XON) does NOT start Reader
1XXX 3XXX	≠ 0	≠ 0	17 (DC1)	DC1 (XON) starts Reader
1XXX 3XXX	≠ 0	0	17 (DC1)	DC1 (XON) starts Reader

4. KEYBOARD CONTROLS

All the functions of the Facit 4046/4047 are controlled from a small keyboard located on the control panel. A digital readout consisting of four 7-segment displays is located above the keyboard.

Each key (except the [0] key) has two functions. In normal use the upper functions (printed on the keys) are applicable, and the display shows the operating status of the unit.

When the [PRGR] key is depressed, the unit enters the Program mode, and the lower function of each key then applies. The keyboard is used to enter numeric programming data, and the display shows the Program mode values. Programming is described in section 5.



The keyboard functions in normal use are explained in the following tables. Most of the keys operate only with the unit Off-line, and some keys are functional only when the tape reader is present.

When the mains supply is initially switched on, the unit goes Off-line, and OFF appears in the display.

4.1 Key Functions (Facit 4046)

The keys described in Table 1 have functions only when the unit is Off-line. When On-line, the only functional key is the [OFF L] key (Table 2). The display shows the function initiated by each key when depressed.

4.2 Key Functions (Facit 4047)

The key functions already described in Tables 1 and 2 apply also to the Facit 4047 Reader/Punch Combination. The remaining keys allow control of the reader and are described in Tables 3 and 4.

TABLE 1 KEY FUNCTIONS IN OFF-LINE MODE

KEY	DISPLAY	FUNCTION
FEED	FEEd	Feed holes are punched in the blank tape while the key is depressed.
CODE	Code	Both code and feed holes are punched in the blank tape while the key is depressed.
ON L	Line	When this key is depressed and released, the unit goes On-line and can communicate with externally connected equipment via the I/O ports.
PRGR	Prog	When this key is depressed and released, the unit enters the Program Mode (see section 5). The lower functions of all keys now apply.
TEST	TEST	When this key is depressed and released, the unit enters a comprehensive self-test mode (see section 8).

TABLE 2 KEY FUNCTION IN ON-LINE MODE

KEY	DISPLAY	FUNCTION
OFF L	OFF	When this key is depressed and released, the unit goes Off-line and is disconnected from the external equipment.

TABLE 3 KEY FUNCTIONS IN OFF-LINE MODE (READER)

KEY	DISPLAY	FUNCTION
FF	FF	Tape in the Reader feeds forward while the key is depressed. Reading of data is inhibited.
FB	Fb	Tape in the Reader feeds backwards while the key is depressed. Reading of data is inhibited.
COPY	CopY	The punch and reader combination enters the Copy mode. A tape in the reader will be directly copied by the punch when the [START] key is depressed (see below).
START	CopY	When this key is depressed and released in Copy mode, the Reader and Punch both start. A tape in the reader is directly copied by punch in accordance with the punch programming (see section 5).
STOP	CopY	When this key is depressed and released while in Copy mode, the Reader stops. The Punch continues until the buffer is empty.

TABLE 4 **KEY FUNCTIONS IN ON-LINE MODE
(READER)**

KEY	DISPLAY	FUNCTION
START	L in E	When this key is depressed and released, the Reader starts and data from the tape is read and transmitted via the channel 1 I/O port.
STOP	L in E	When this key is depressed and released, the Reader stops.

5. PROGRAM MODE

The complete range of data handling and interfacing parameters is software controlled by entries made on the keyboard when in the Program mode. Each parameter is held within its specific Program mode number, and the display shows the mode number and the parameter value sequentially. All parameters are displayed numerically.

The flow diagram in fig. 8 shows the method of selecting the program modes, checking the parameter values, and changing them where required. A full program listing is given in Tables 5 and 6.

The user can select modes either in sequence (mode 1, then mode 2, then mode 3, etc.) or directly, and can change the associated parameter value if required.

5.1 Select Modes in Sequence

After depressing the [PRGR] key to enter the Program mode, repeatedly depressing the [*] key will display all modes and their associated parameter values in sequence.

5.2 Select Mode Directly

After depressing the [PRGR] key and then the [*] key to enter mode 1, any other required mode can be selected by depressing the number key(s) required (modes available are 2 to 22). The display will show the selected mode number, and

depressing the [*] key will then show the parameter value of that mode.

Note: Mode 1 must always be entered FIRST before the required mode is selected.

5.3 Change Parameter Value

The unit as supplied has each of the mode parameters set to a 'default value', which may be changed to suit individual requirements.

This is done by selecting the required mode and depressing the [*] key to display the parameter value. The new required value may then be keyed in directly; the display then shows the new value. Further modes can now be selected as previously described.

5.4 Program Modes 1 to 4

These modes set the baud rate, data word construction and start/stop protocol, selectable separately for channels 1 and 2.

Using the protocols 1 or 3 (Buffer Ready/Busy) means that pin 19 in the interface (see page 21) is set low when 50 characters are left in the buffer. When more space is available pin 19 is set high again.

Using protocols 2 or 4 means that XOFF (DC3) is sent when 50 characters are left in the buffer. When more space is available XON (DC1) is sent.

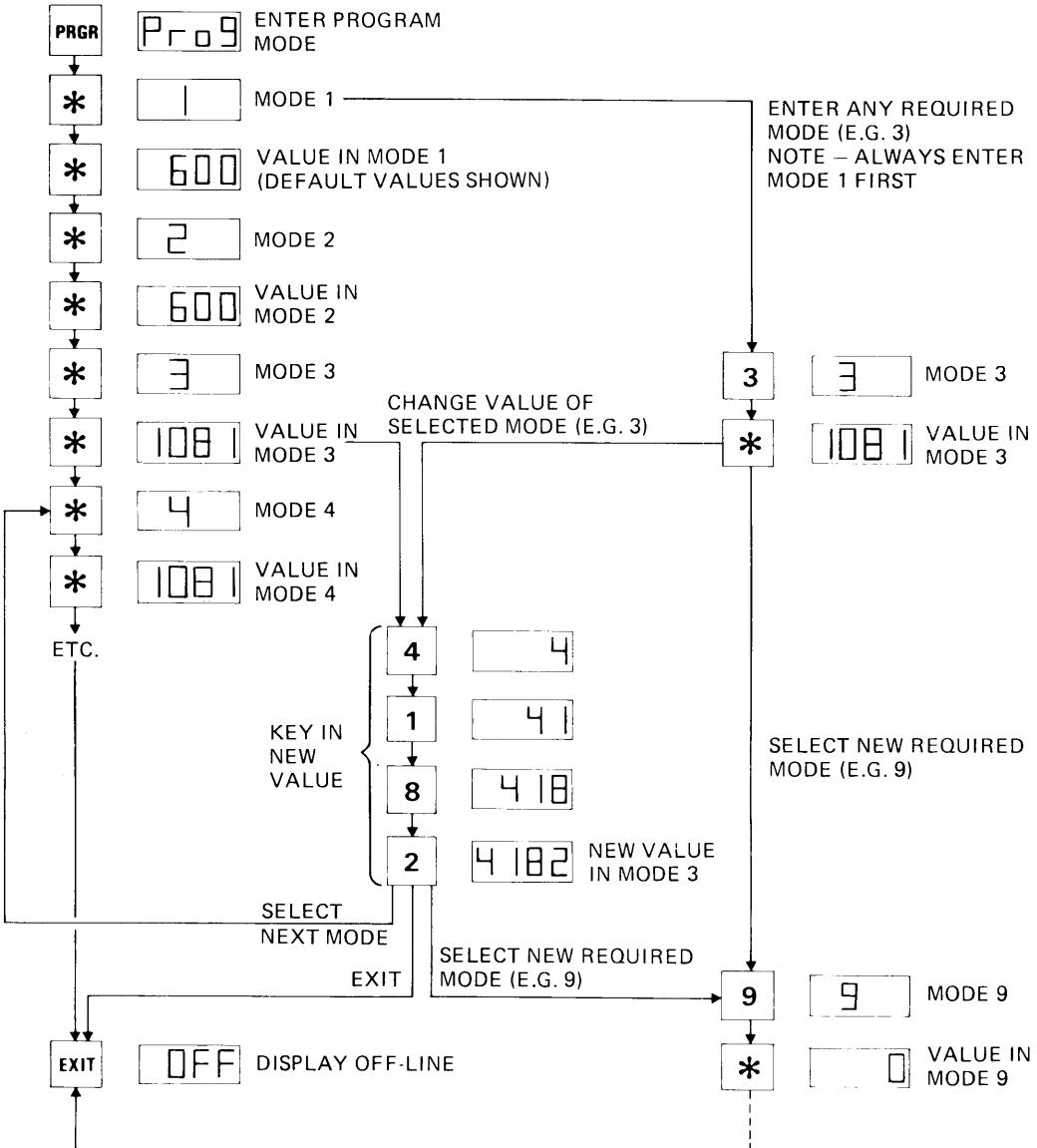


Fig. 8 Program Mode Selection

Echo means that all characters sent are echoed back again. This requires full duplex communication.

If parity (odd or even) is set parity will be generated when sent from reader to the line and checked when sent from the line to the punch. The checked parity bit is however cleared, and in order to retain the parity bit at the punch, the same parity (odd or even) must be set in program step 5. If parity error is detected on data sent to the punch the code set in program step nr 13-1 to 13-4 is punched (see table 6, page 16). One to four codes can be set in decimal 0-255. If for instance 255 is set a delete character will be punched each time a parity error is detected. If you set the values 80, 65, 82, 42 the characters "PAR**" will be punched.

5.5 Program Mode 5

This mode sets punch and reader parity, and normal (single) or double punching. When double punching is selected, the punch operates twice at each character position. This double punching is desirable with some types of tape to ensure that punching is effected completely.

If parity is selected for the reader parity will be checked when reading. The checked parity bit is however cleared, and in order to retain the parity bit at the line, the same parity (odd or even) must be set in program step 3. If a parity error is detected the code set in program step 13-1 to 13-4, as above, will be sent to the line.

5.6 Program Modes 6 and 7

These modes select the code conversion that is performed on incoming data. Parameter values cater for conversion from incoming data to the required output code.

If program modes 6/7 are set to 0 (zero) a transparent punching will be made. No function codes will influence the punching. No leaders and trailers will be punched automatically. The first character coming to the buffer will start the punch. No parity is generated if not sent to the punch. Parity can be checked on the line if set in program step 3/4.

5.7 Program Modes 8 and 9 (Facit 4047 Combination Only)

Mode 8 selects the code conversion performed when in Copy mode (see section 4.2).

Mode 9 selects the code conversion performed during tape reading.

If Copy is set to 0 (zero) a transparent copy will be performed. The reader will continue to read until stopped by Stop key or until end of tape. If the buffer is full the reader will stop and automatically start again when space is available in the buffer. No function codes (program modes 13 to 22) will influence the copy. No parity is checked.

If copy is set to 100 a five track telex tape can be copied. A five track tape shall be in the punch. No function codes will influence the copy. If copy is set to 1000, no NUL-characters will be copied. All other characters will be copied as transparent copy.

If any other value is set for Copy the function codes set in Program 13–22 will influence the Copy. This means for instance that reader stop (16) will stop the reader. Parity, if set in program step 5, will be checked by reading or generated by punching. Detected parity errors will be punched as the code in program step no. 13.

If program mode 9 is set to 0 (zero) a transparent reading will be made. The function codes will not influence the reading. Parity will be checked if set in program step No. 5. If program mode 9 is set to 1000, no NUL-characters will be sent. All other characters will be sent as in transparent reading.

5.8 Program Modes 10 and 11

Mode 10 sets the time period that the unit 'waits' for a late or missing End of Message code before terminating the message (see section 7.3). When in transparency mode the time out is automatically set to one second.

Mode 11 selects whether control codes (set in modes 13 to 22) are punched when received at the punch, or transmitted when read by the reader.

5.9 Program Mode 12

This mode effectively divides the buffer between channels 1 and 2, by specifying the end address for data from channel 1.

5.10 Program Modes 13 to 22

These modes allow the programming of specific control codes to which the unit will respond. Each control code may consist of up to four characters, and each mode is subdivided into four steps to select and hold each character. Each character is entered using its decimal value. These program modes, 13–22, are not valid when in transparency mode (codes 0, 100 and 1000).

Program mode 13.

In program mode 13 the values can be 0–255. This program mode is used when parity control is made, reading a tape or punching a tape. In program mode 13 one to four characters

can be set, which will be sent or punched, when at parity error is detected.

Program mode 14.

This program mode is used to set one to four codes to start the reader. If you wish to start the reader using DC1 code, set the value 17, decimal for DC1. See also 3.6 above.

Program mode 15.

Program mode 15 is used to set the code for End of Line. This code shall correspond to the code for End of Line sent over the line. It is normally CR (dec 13) or LF (dec 10) or both of them together. If both CR and LF are sent the program mode 15 shall be set to 13 + 10. If no End of Line is sensed, the punch will start when the buffer is full or when End of Message (program mode 17) is sensed or after time out (program mode 10).

Program mode 16.

Program mode 16 is used to stop the reader. When the code set in this program mode is sensed the reader will stop. See also 3.6 above.

Program mode 17.

Program mode 17 is used for End of Message. The code set in this program mode will clear the buffer and make reading possible or punching from the other buffer. If no End of Message is sensed the time out will clear the buffer. The End of Message code can include CR or LF codes. If for instance the End of Message is * (dec 42) and this is always followed by CR + LF, the End of Message codes are set as follows: *CRLF, dec 42, 13, 10.

Program mode 18.

Program mode 18 is used to write in clear text. This function means that characters sent to the punched are represented in a hole pattern, which makes it possible to read the tape visually. The hole pattern is depending on the code set in program modes 6/7 above. For telex tape, five tracks are used and for all other tapes eight tracks are used. Clear text is used to label a telex message or an NC-program tape. The clear text is ended when End of Line is sensed. The clear text can also be ended using a code in program mode 19.

Program mode 20 and 21.

These two program modes are used only for telex code conversion in the Scandinavian countries. Program mode 20 is used to set a code conversion, which translates the national use characters into special locantions in the telex code. Program mode 21 is used when international coding is used.

Program mode 22.

Program mode 22 is used to cancel a message by writing the word CANCEL in clear text at the tape. This function is used only when punching telex tapes.

5.11 Error Messages

If any mistake is made by the operator during programming, the display shows the message 'Err' (not blinking). Depressing the [*] key will clear the display and allow further program entries.

TABLE 5

PROGRAM MODES 1 TO 12

PROGRAM MODE NO.	FUNCTION	CHANNEL	VALUES AVAILABLE (Display Figure shows Default Value)
1	Baud Rate	Channel 1	110 150 300 600 1200 2400 4800
2	Baud Rate	Channel 2	600
3	Protocol Parity Word length Stop Bits	Channel 1	<p>Protocol —</p> <p>1 = Buffer Ready/Busy, no echo 2 = X-ON/X-OFF, no echo 3 = Buffer Ready/Busy, echo 4 = X-ON/X-OFF, echo</p> <p>Parity —</p> <p>0 = No parity 1 = Odd parity 2 = Even parity</p>
4	Protocol Parity Word length Stop Bits	Channel 2	<p>Word length —</p> <p>7 = 7 bits Note. 7 or 8 bits can be used when parity is selected. 8 = 8 bits 8 bits must be used when No parity is selected.</p> <p>Stop Bits —</p> <p>1 = 1 stop bit 2 = 2 stop bits</p>
5	Punch Mode Punch Parity Reader Parity		<p>Punch Mode —</p> <p>1 = Normal 2 = Double</p> <p>Punch Parity —</p> <p>0 = No parity 1 = Odd parity 2 = Even parity</p> <p>Reader Parity —</p> <p>0 = No parity 1 = Odd parity 2 = Even parity</p>
6	Code Conversion to Punch (from ASCII)	Channel 1	0 = Transparent punch 1 = ASCII 2 = Telex (5) USA 3 = Telex UK 4 = Telex Scandinavia 5 = Telex Germany 6 = Telex Switzerland 7 = Telex France 8 = Telex Italy 9 = Telex Spain 10 = Telex Portugal 11 = Telex (8) USA (RS-358) 12 = EIA (RS-244) 112 = EIA (RS-244) to ASCII 1000 = Transparent punch without NUL-characters.
7	Code Conversion to Punch (from ASCII)	Channel 2	

TABLE 5 continued

PROGRAM MODE NO.	FUNCTION	CHANNEL	VALUES AVAILABLE (Display Figure shows Default Value)
8	Copy Mode — Code Conversion from Reader to Punch		0 = Transparent Copy 1 to 12 and 112: As modes 6 and 7 100 = Copy Telex to Telex 102 = Telex (5) USA to ASCII 103 = Telex UK to ASCII 104 = Telex Scand. to ASCII 105 = Telex Germany to ASCII 106 = Telex Switzerland to ASCII 107 = Telex France to ASCII 108 = Telex Italy to ASCII 109 = Telex Spain to ASCII 110 = Telex Portugal to ASCII 1000 = Transparent copy without NUL-characters.
9	Code Conversion from Reader		0 = Transparent reading 1, 12 and 112: As modes 6 and 7 100 = Telex reading 102 to 110: As mode 8 1000 = Transparent reading without NUL-characters.
10	Time Out		1 to 9999 secs. 60
11	Control code Processing	Channels 1 and 2	0 = Not Punched or Sent 1 = Punched or Sent Channel 1 _____ Channel 2 _____ Reader _____ Copy Mode _____ Note (1) Control codes applicable are only those defined in Program Modes 16 to 22. (2) The 'Start Reader' code (mode 14) is never punched or sent. (3) The 'End of Line' code (mode 15) is always punched or sent.
12	End Address for Channel 1 Buffer		256 to 3338 3184

TABLE 6

PROGRAM MODE 12 TO 22 (CONTROL CODE SELECTION)

PROGRAM MODE NO.	FUNCTION	CHANNEL	DEC VALUES AVAILABLE	DEFAULT VALUE
13—1 to 13—4	Parity Error		0 to 255	0
14—1 to 14—4	Start Reader		0 to 127	0
15—1 to 15—4	End of Line		0 to 127	10=LF
16—1 to 16—4	Stop Reader		0 to 127	0
17—1 to 17—4	End of Message		0 to 127	20=DC4
18—1 to 18—4	Start Clear Text		0 to 127	0
19—1 to 19—4	Stop Clear Text		0 to 127	0
20—1 to 20—4	National Code Conversion		0 to 127	0
21—1 to 21—4	International Code Conversion		0 to 127	0
22—1 to 22—4	Cancel Message		0 to 127	0

6. CODE CONVERSION

This section describes the code conversion which is performed on incoming data to convert it to the required format. The format is selected in Program modes 6 and 7, and details of individual character conversions are given in the Appendices. Conversions of control characters depend upon the control codes selected in Program modes 12 to 21.

6.1 ASCII to ASCII

This conversion is performed directly and without any special formatting.

All characters, except defined control codes, are punched (or transmitted, if read by the reader). Control codes initiate their respective functions and are punched or sent, if this is selected by Program mode 11.

Codes for National and International conversions and for Start and Stop Cleartext, do not initiate any function during conversion.

If parity is included within the incoming data, it is transferred to bit 8 (if selected by Program mode 5); in this way codes other than ASCII can be transferred.

6.2 ASCII to Telex (5 track)

ASCII characters are converted to 5 track Telex characters in accordance with Appendices 1 and 2, depending upon the National version set in Program modes 6 and 7. Whenever the code for International Conversion is detected, further characters are converted to their international versions. Changing from national to international and back can occur whenever required in the same message.

Formatting and code expansion of the telex message is performed in accordance with the procedures detailed in section 7.

6.3 ASCII to Telex (USA 8 track – RS358)

ASCII characters are converted to 8 track Telex characters in accordance with Appendix 4. National and International versions are not available in 8 track telex, and any conversion control codes present in the incoming message are ignored. The code characters are however converted in accordance with Appendix 4.

Clear text punching occurs in the manner as described in section 7.1, except that an 8 track matrix is used for the clear (readable) characters.

Formatting and code expansion are performed generally as described in sections 7.4 and 7.5, except that the maximum telex line length is 72 characters instead of 69.

6.4 ASCII to EIA (RS244)

ASCII characters are converted to 8 track EIA characters in accordance with Appendix 3. The 5th track bit is always added to give odd parity, and is always punched irrespective of the punch parity setting in Program mode 5.

6.5 EIA (RS244) to ASCII

Eight track EIA characters are converted to ASCII characters in accordance with Appendix 3.

In the EIA code, character CR (EOB) is defined as the End of Line control code.

7. TELEX TAPE FORMATTING

This section describes the processing which is performed on incoming data to convert it to the 5 track telex format. The telex format is determined by the code conversion selected in Program modes 6 and 7 (see section 6). All other facilities available for the preparation of telex tapes are also described.

7.1 Clear Text Punching

This facility allows a message to the telex operator to be

punched, in a directly readable form, at the start of the telex tape. This Clear Text facility is entered and exited by control codes selected in Program modes 18 and 19.

The table below explains the transmission sequence for control codes and data for start/stop of cleartext and start/stop of telex message, and describes the action taken by the punch at each step.

Data In	Punch Action	See note
Code (Start Clear Text)	50 x Feed Forward (FF)	(1)
Data (Message to Operator)	Punch Clear Text	(2)
Code (End Clear Text)	50 x FF 10 x LS 2 x CR 1 x LF] = New Line	(3)
Data (Telex Message)	Punch Telex	
Code (End of Telex)	2 x CR 1 x LF] = New Line 50 x FF	(see section 7.2)

Notes: (1) The Start Clear Text code must always precede the cleartext message. If it arrives within the message, it is ignored. Other control codes may precede the Start Clear Text code and will be acted upon.

If several messages including clear text are sent in sequence it is important, that no data characters are transmitted between the End of Message Code (see 7.2) and the code for Clear Text of the following message. If for instance the last line of a preceding message ends with End of Message code and a following End of Line, the End of Line can be included in the End of Message Code.

Example:

End of Message = * (42)

The last line is however transmitted as * + CR. In this case the End of Message is set as * (42) + CR (13) in program step 17. The following character, which can be function code for Clear Text of the next message, will then work properly.

(2) Only ASCII coded letters A to Z (upper and lower case) including Space, and numbers 0 to 9 are accepted as cleartext characters. Other characters (except control codes) are ignored. If no clear text is received, the punch assumes the Stop Clear Text code has been received, (see note 3).

(3) The Stop Clear Text code ceases cleartext punching, and enables telex punching in accordance with the appropriate code conversion chart.

In addition to the code for Stop Clear Text an End of Line will act as Stop Clear Text. If End of Line is used the code for Stop Clear Text (19) can be set to Zero.

7.2 End of Message Code

The control code for End of Message terminates the message, and the remaining contents of the associated buffer are punched out. When this is complete, priority then goes over to the second buffer, and its data (if any) is punched out.

If the End of Message control code is not received, a Time Out function is initiated to re-enable normal operation of the unit.

7.3 Time Out Function

The Time Out function allows the unit to 'wait' for a time period set in Program mode 10. After this period has elapsed, the message is terminated.

The punch is then re-enabled as described in section 7.2.

7.4 Line Length Adjustment

Each line of telex has a maximum of 69 characters. If the incoming data has line lengths in excess of this, an automatic program divides any such lines into two.

This line adjustment is done after the conversion to telex code. If the conversion results in a line longer than 69 characters, an automatic End of Line is generated. If, however, the first characters after the 69:th character is an End of Line (CR or LF or CR + LF) no End of Line is generated.

Note. Because some incoming ASCII-characters are expanded when converted to telex code, there is always a risk that an incoming line of 69 characters can be longer and thus divided into two lines.

7.5 Code Expansion

Some character symbols exist only in particular national versions and are expanded to letters in other national versions. Examples of these symbols are \$ (expanded to DLR) and & (expanded to AND). This process results in an increase in overall line length, and where included within a tabulated area, the tabulation may be altered.

To correct this, the number of spaces later in the message is reduced in proportion, where possible, as described in section 7.6.

7.6 Reduction of Spaces

In tabulated data, there are normally two or more spaces between blocks of characters. The program calculates this number of spaces.

If the total exceeds 62, the code 2 x CR + LF is added to generate a new line.

If the total is less than 62, the immediately preceding text is examined. Where any of this text has been expanded, the number of spaces is reduced by the same amount as the extra characters generated as a result of text expansion.

An example of this technique is shown below:

Received Message	£ 1 2 3 4 □□ □□□□ X Y Z
Expanded	PND 1 2 3 4 □□□□□ X Y Z (2 extra chars.)
With space reduction	PND 1 2 3 4 □□□□ X Y Z (2 less spaces)

Where the total quantity of spaces is less than, or equal to, the number of extra characters, one space is always kept between blocks of text to keep them separate.

For example:

Received Message	£ 1 2 3 4 □□ X Y Z
Expanded	PND 1 2 3 4 □□ X Y Z (2 extra chars.)
With space reduction	PND 1 2 3 4 X Y Z (2 less spaces)
Insert one space	PND 1 2 3 4 □ X Y Z

8. TEST MODE

When the [TEST] key is depressed in the Off-line mode, the unit enters the Test mode and the display shows TEST. Depressing the [*] key then selects the first of seven test routines, (the display shows 1). Depressing the [TEST] key then starts the first test routine. If this routine is completed without failure, the display then changes to 2, and depression of the [TEST] key starts the second test routine. This procedure is continued until all seven test routines are completed.

Any test routine may be entered by depressing the [*] key a number of times until the desired test routine number appears in the display. This test is then started by depressing the [TEST] key.

The test routine may be exited at any time by depressing the [EXIT] key.

A fault or failure in any test routine is shown on the display.

8.1 Test Mode 1 – Memory Test

The whole buffer memory (RAM 1 and RAM 2) is written with a '1' at each address location, and is then read. The memory is then cleared with '0's' at each address location, and again read.

Reading of the memory starts with the lowest address first. If any location is found to be defective, its decimal address is shown on the display and testing stops.

A faulty address ≤ 2047 indicates that RAM 1 is faulty; if > 2047 then RAM 2 is faulty. If no fault is present, the unit enters Test Mode 2.

8.2 Test Mode 2 – Channel 1 Communication Test

This test monitors the transmission and reception of all binary codes for the full set of ASCII characters. A test plug is required, fitted to the I/O port for channel 1, to carry out this test (see fig. 10).

The test is performed at the currently set baud rate. Each character is sent, received and checked in turn, until a faulty character is found. The display then shows the faulty character in decimal form and further testing stops. Depressing the [*] key shows the correct character, in decimal form.

The test is continued by depressing the [TEST] key; and when completed, the unit enters Test Mode 3.

8.3 Test Mode 3 – Channel 2 Communication Test

This test is an exact repeat of Test Mode 2, except that channel 2 is monitored, and the test plug is fitted to the I/O port for channel 2.

8.4 Test Mode 4 – Test Tape Punching

In this test, a blank tape is punched with a set of code holes ranging from Hex 00 to Hex 31 (for 5 channel tapes), or Hex 00 to Hex 255 (for 8 channel tapes), depending upon the Reader Code Conversion selected in Program Mode 9 (see section 5.7).

The test tape always starts and finishes with 50 x NUL. When the test tape is completed, the unit enters Test Mode 5.

8.5 Test Mode 5 – Test Tape Reading (Facit 4047 Combination Only)

This test enables the test tape punched in Test Mode 4 to be read by the reader. Note that the Reader Code Conversion (Program Mode 9) must be set to the same value used in Test Mode 4.

With the tape placed in the reader, depressing the [TEST] key starts the reader and checks the punched data. The reader stops when an incorrect character is read, and the display shows that character as its decimal value. Depressing the [*] key will show the correct value in the display.

Testing is continued by depressing the [TEST] key, and reading continues until the whole tape is read. The unit then enters Test Mode 6.

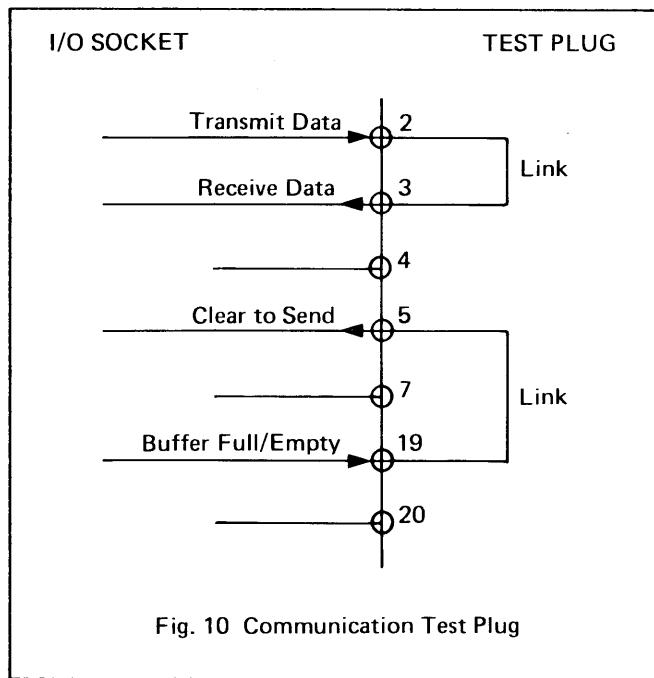
8.6 Test Mode 6 – Single Track Punching

This test enables individual punch pins to be checked separately. Depressing the [TEST] key causes a blank tape to feed through the punch; any one track 1 to 8 may now be punched continuously by depressing the required number key 1 to 8. The track being punched can be changed at any time by depressing another number key.

Punching is stopped by depressing the [EXIT] key.

8.7 Test Mode 7 – Continuous Test Tape Punching

This test is similar to Test Mode 4 except that a continuous test tape is punched. The tape starts with 50 x NUL and continues with codes Hex 00 to Hex 31 (for 5 channel tapes) or Hex 00 to Hex 255 (for 8 channel tapes). When finished, the code sequence is immediately restarted (without the leading NUL's); this process repeats continuously until the [EXIT] key is depressed.



9. INTERFACE CONNECTIONS

This section describes the external connections required to interface with the Facit 4046/4047. Mains and I/O connectors, fuses and the mains ON/OFF switch are fitted on the rear panel as shown in fig. 11.

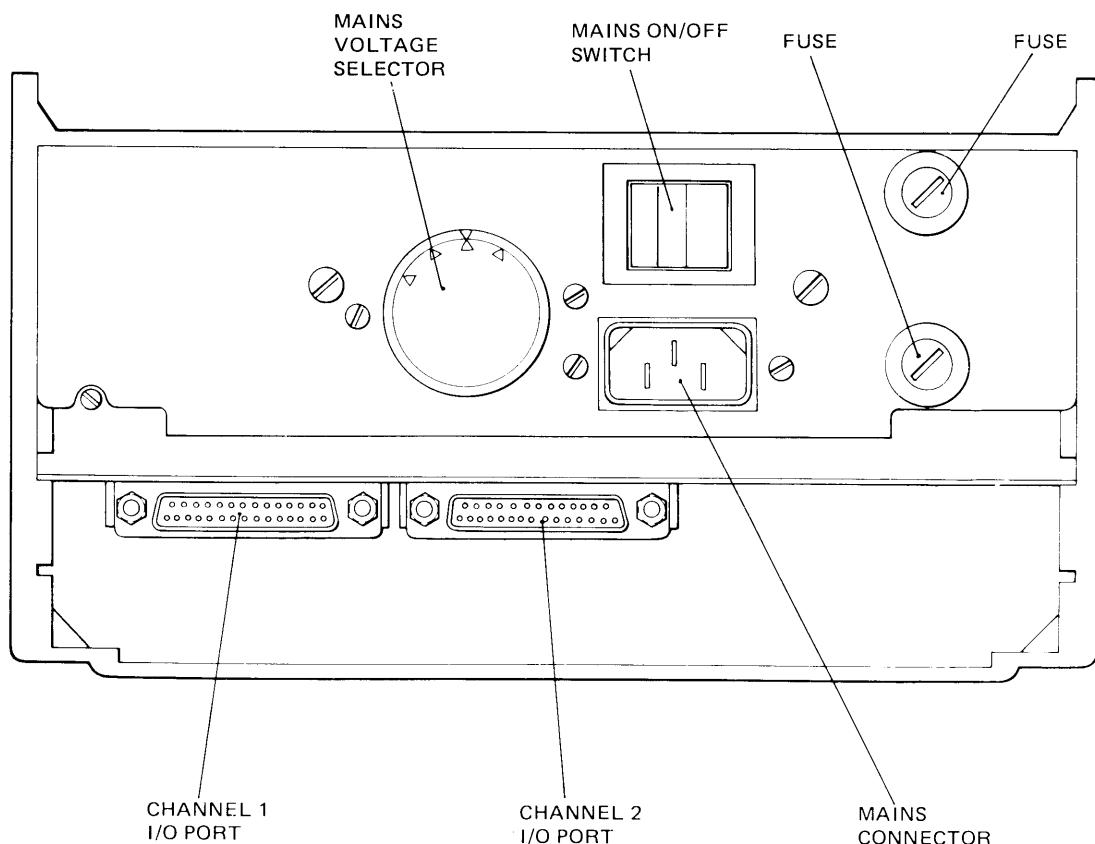
9.1 Data I/O Connectors

The data I/O ports are standard 25 way V.24/RS-232-C serial interface connectors. The interface connector pin allocations are shown in fig. 12. For the Facit 4046 (without reader) both channel 1 and 2 inputs are identical and priority of one channel over the other is established by the buffer status (see section 3.1).

For the Facit 4047 Reader/Punch Combination, data transmitted from the reader goes out via channels 1 or 2 when controlled from the keyboard or externally. When controlled from the punch, data goes out via channel 1 only.

9.2 Current Loop Interface

The Facit 5165 current loop interface is available as an option for direct connection between the 4046/4047 I/O ports and the user equipment.



Connector 25 pole female Cannon DB 25S

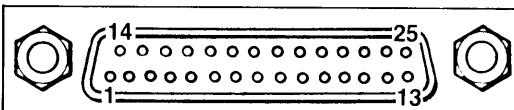


Fig. 11 External Connections

4046/4047

I/O CONNECTORS

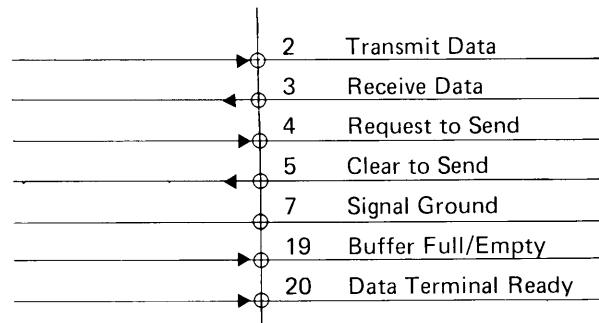


Fig. 12 I/O Connector Pin Allocations

Note +5V can be supplied an pin 18. Bridge W6 or W7 or both
must be connected for this. See spare part list.

10. TECHNICAL SPECIFICATION

Punch

Punching speed	60 characters per second
Punch hole configuration	5 or 8 track ISO standard
Tape widths	5 track 17.5 mm (11/16 in) 8 track 25.4 mm (1 in)
Tape thickness	0.08 – 0.11 mm
Type of tape	ISO standard paper tape
Tape reel hub	Accommodates 50.8 – 52.4 mm (2 in) reel cores
Outside diameter of tape reel	Max. 203 mm (8 in)
Reel capacity	Approximately 300 m (approx. 120,000 characters)
Feed accuracy	Complies with ISO standards: Adjacent rows 3%, 10 rows 1%, 50 rows 0.5%
Noise level	Idling None 5 track 60 c.p.s. 63 dB 8 track 60 c.p.s. 65 dB
Interface	Two independent V.24/RS-232C serial interfaces. Baud rates 110 to 4,800
Current loop	Available as option by using Facit 5165 Current Loop Adaptor
Buffer	3.5K capacity, freely divisible between the two interfaces
Protocol	Ready/Busy and X-ON/X-OFF.
Code conversions	ASCII to 5 track telex. National and International versions ASCII to RS-244 (EIA) and RS-358B (8-track version only)

Operator keyboard	12 key keyboard used for operator control and programming control
Operator display	4 digit display showing operating status and program status
AC mains voltage	Switchable for 100/115/220/240V +15% – 10%
Power consumption	150W maximum
Dimensions and weight	Height 200 mm Width 220 mm Depth 520 mm (without reader) 575 mm (with reader)

Reader

Reading speed	120 c.p.s.
Reading method	Optical
Tape feed	Stepping motor and sprocket wheel
Tape widths	5, 6/7 and 8 track
Inter-character spacing	To ISO standards
Tape thickness	Maximum 0.25 mm incl. splice
Tape material	Any tape with a transmissivity of up to 60%
Manual tape feed	Bidirectional controlled from keyboard

Versions

4046 Punch (Europe)	9280 36 01-01
4046 Punch (USA)	9280 36 02-01
4047 Reader/punch (Europe)	9280 37 01-01
4047 Reader/punch (USA)	9280 37 02-01

APPENDIX 1
CODE CONVERSION CHART (GENERAL)
ASCII TO 5 TRACK TELEX

ASCII		TELEX				TYPE OF CHARACTER
		LS		FS		
CHAR	HEX	CHAR	HEX	CHAR	HEX	
NUL	00	Blank	00			Control (see note 1)
SOH	01					Control
STX	02					Control
ETX	03					Control
EOT	04					Control
ENQ	05					Control
ACK	06					Control
BEL	07					Control
BS	08					Control
HT	09					Control
LF	0A	LF	08			Control
VT	0B					Control
FF	0C					Control
CR	0D	CR	02			Control
SO	0E					Control
SI	0F					Control
DLE	10					Control
DC1	11					Control
DC2	12					Control
DC3	13					Control
DC4	14					Control
NAK	15					Control
SYN	16					Control
ETB	17					Control
CAN	18					Control
EM	19					Control
SUB	1A					Control
ESC	1B					Control
FS	1C					Control
GS	1D					Control
RS	1E					Control
US	1F					Control
SP	20	SP	04			Control
!	21			•	17	Expanded (see note 2)
"	22			"	14, 14	Expanded (see note 2)
#	23					National (see note 3)
\$	24	DLR	12, 09, 0A			Expanded
%	25					National
&	26	AND	18, 06, 12			Expanded
,	27			,	14	
(28			(1E	
)	29)	09	
*	2A					Control
+	2B			+	11	
,	2C			,	06	

APPENDIX 1
CODE CONVERSION CHART (GENERAL)
ASCII TO 5 TRACK TELEX

ASCII		TELEX				TYPE OF CHARACTER
		LS		FS		
CHAR	HEX	CHAR	HEX	CHAR	HEX	
-	2D			-	18	
.	2E			.	07	
/	2F			/	17	
0	30			0	0D	
1	31			1	1D	
2	32			2	19	
3	33			3	10	
4	34			4	0A	
5	35			5	01	
6	36			6	15	
7	37			7	1C	
8	38			8	0C	
9	39			9	03	
:	3A			:	0E	
;	3B					Control
<	3C					Control
=	3D			=	0F	
>	3E					Control
?	3F			?	13	
@	40					National
A	41	A	18			
B	42	B	13			
C	43	C	0E			
D	44	D	12			
E	45	E	10			
F	46	F	16			
G	47	G	0B			
H	48	H	05			
I	49	I	0C			
J	4A	J	1A			
K	4B	K	1E			
L	4C	L	09			
M	4D	M	07			
N	4E	N	06			
O	4F	O	03			
P	50	P	0D			
Q	51	Q	1D			
R	52	R	0A			
S	53	S	14			
T	54	T	01			
U	55	U	1C			
V	56	V	0F			
W	57	W	19			
X	58	X	17			
Y	59	Y	15			

APPENDIX 1
CODE CONVERSION CHART (GENERAL)
ASCII TO 5 TRACK TELEX

ASCII		TELEX				TYPE OF CHARACTER
		LS		FS		
CHAR	HEX	CHAR	HEX	CHAR	HEX	
Z	5A	Z	11			
[5B					National
\	5C					National
]	5D					National
^	5E					Control
-	5F					Control
`	60					Control
a	61	A	18			
b	62	B	13			
c	63	C	0E			
d	64	D	12			
e	65	E	10			
f	66	F	16			
g	67	G	0B			
h	68	H	05			
i	69	I	0C			
j	6A	J	1A			
k	6B	K	1E			
l	6C	L	09			
m	6D	M	07			
n	6E	N	06			
o	6F	O	03			
p	70	P	0D			
q	71	Q	1D			
r	72	R	0A			
s	73	S	14			
t	74	T	01			
u	75	U	1C			
v	76	V	0F			
w	77	W	19			
x	78	X	17			
y	79	Y	15			
z	7A	Z	11			
{	7B					National
-	7C					National
}	7D					National
~	7E					National
DEL	7F	LS	1F			

Note 1 These (control) characters in all languages are only acted upon if defined in the program mode as control characters (see section 5).

Note 2 These symbols are always expanded to the characters shown, in all languages.

Note 3 These characters are converted in accordance with the National or International code variation depending upon the appropriate control character present in the data stream (see section 6.2). The specific conversions are given in Appendix 2.

APPENDIX 2
CODE CONVERSION CHART (NATIONAL AND INTERNATIONAL)
ASCII TC 5 TRACK TELEX

ASCII		US		UK		SW, DK, N		GERMANY		SWITZ.		FRANCE		ITALY		SPAIN		PORTUGAL		
CHAR	HEX	CHAR	HEX	CHAR	HEX	CHAR	HEX	CHAR	HEX	CHAR	HEX	CHAR	HEX	CHAR	HEX	CHAR	HEX	CHAR	HEX	
#	23	NR	(LS) 06 0A	*£	(FS) 05	PND	(LS) 0D 06 12	CONTROL CHAR ONLY		CONTROL CHAR ONLY		PND	(LS) 0D 06 12	PND	(LS) 0D 06 12	CONTROL CHAR ONLY		CONTROL CHAR ONLY		
				PND	(LS) 0D 06 12															
@	40	A	(LS) 18	*@	(FS) 0B	PARA	(LS) 0D 18 0A 18	PARA	(LS) 0D 18 0A 18	PARA	(LS) 0D 18 0A 18	(FS) 14	(FS) 14	PARA	(LS) 0D 18 0A 18	CONTROL CHAR ONLY		CONTROL CHAR ONLY		
				A	(LS) 18															
[5B	CONTROL CHAR ONLY		CONTROL CHAR ONLY		*A	(FS) 0B	AE	(LS) 18	AE	(LS) 18	AE	(LS) 10	AE	(LS) 18	CONTROL CHAR ONLY	CONTROL CHAR ONLY	(FS) 14	CONTROL CHAR ONLY	
						AE	(LS) 18 10													
\	5C	CONTROL CHAR ONLY		C	(LS) OE	*O	(FS) 05	OE	(LS) 03	OE	(LS) 03	C	(LS) OE	C	(LS) OE	*Ñ	(FS) 05	CONTROL CHAR ONLY		
				OE	(LS) 03 10											N	(LS) 06	CONTROL CHAR ONLY		
]	5D	CONTROL CHAR ONLY		CONTROL CHAR ONLY		*À	(FS) 16	UE	(LS) 1C	UE	(LS) 1C	A	(LS) 18	A	(LS) 18	?	(FS) 13	*À	(FS) 16	
				AA	(LS) 18 18											A	(LS) 18	À	(LS) 18	
%	25	PCT	(LS) 0D 0E 01	*%	(FS) 16	PCT	(LS)	0/0	(FS) 0D	PCT	(LS)	PCT	(LS) 0D	PCT	(LS)	PCT	(LS)	PCT	(LS) 0D 0E 01	
				PCT	(LS) 0D 0E 01				0D	PCT	(LS) 0E	PCT	(LS) 0E	PCT	(LS)	PCT	(LS)	PCT	(LS) 0D 0E 01	
-	5E	CONTROL CHAR ONLY		CONTROL CHAR ONLY		CONTROL CHAR ONLY		CONTROL CHAR ONLY		CONTROL CHAR ONLY		CONTROL CHAR ONLY		CONTROL CHAR ONLY		CONTROL CHAR ONLY		CONTROL CHAR ONLY		
{	7B	CONTROL CHAR ONLY		E	(LS) 10	*À	(FS) 0B	AE	(LS) 18	AE	(LS) 18	E	(LS) 10	E	(LS) 10	CONTROL	CHAR	CONTROL	CHAR	
				AE	(LS) 18 10											CHAR	ONLY	CHAR	ONLY	
	7C	CONTROL CHAR ONLY		CONTROL CHAR ONLY		*Ö	(FS) 05	OE	(LS) 03	OE	(LS) 03	U	(LS) 1C	U	(LS) 1C	*Ñ	(FS) 05	CONTROL	CHAR	
				OE	(LS) 03 10											N	(LS) 06	CHAR	ONLY	
{	7D	CONTROL CHAR ONLY		PARA	(LS) 0D	*À	(FS) 16	UE	(LS) 1C	UE	(LS) 1C	E	(LS) 10	E	(LS) 10	C	(LS) OE	À	(FS) 16	
				18	18	AA	(LS) 0A 18		10		10					A	(LS) 18	À	(LS) 18	
^	7E	CONTROL CHAR ONLY		CONTROL CHAR ONLY		UE	(LS) 1C 10	SS	(LS) 14	SS	(LS) 14	CONTROL CHAR ONLY		CONTROL CHAR ONLY		CONTROL CHAR ONLY		CONTROL CHAR ONLY		

* means National Code conversion. All others are International Code conversions.

(FS) means Figure Shift

(LS) means Letter Shift

APPENDIX 3
CODE CONVERSION CHART (US)
ASCII TO EIA (RS244)

ASCII		EIA	
CHAR	HEX	CHAR	HEX
NUL	00		
SOH	01		
STX	02	Control char only (see note 1)	
ETX	03		
EOT	04		
ENQ	05		
ACK	06		
BEL	07		
BS	08	BS	2A
HT	09	TAB	3E
LF	0A	CR (EOB)	80
VT	0B		
FF	0C		
CR	0D		
SO	0E		
SI	0F		
DLE	10		
DC1	11		
DC2	12		
DC3	13		
DC4	14		
NAK	15	Control char only	
SYN	16		
ETB	17		
CAN	18		
EM	19		
SUB	1A		
ESC	1B		
FS	1C		
GS	1D		
RS	1E		
US	1F		
SP	20	Space	10
!	21		
"	22		
#	23	Control char only	
\$	24		
%	25	%	0B
&	26	&	0E
'	27	Control char only	
(28	(1A
)	29)	4A
*	2A	Control char only	
+	2B	+	70
,	2C	,	3B
-	2D	-	40
.	2E	.	6B
/	2F	/	31

ASCII		EIA	
CHAR	HEX	CHAR	HEX
0	30	0	20
1	31	1	01
2	32	2	02
3	33	3	13
4	34	4	04
5	35	5	15
6	36	6	16
7	37	7	07
8	38	8	08
9	39	9	19
:	3A	O (Letter)	46
;	3B		
<	3C		
=	3D		
>	3E		
?	3F		
@	40		
A	41	A	61
B	42	B	62
C	43	C	73
D	44	D	64
E	45	E	75
F	46	F	76
G	47	G	67
H	48	H	68
I	49	I	79
J	4A	J	51
K	4B	K	52
L	4C	L	43
M	4D	M	54
N	4E	N	45
O	4F	O	46
P	50	P	57
Q	51	Q	58
R	52	R	49
S	53	S	32
T	54	T	23
U	55	U	34
V	56	V	25
W	57	W	26
X	58	X	37
Y	59	Y	38
Z	5A	Z	29
[5B		
\	5C		
]	5D		
^	5E		
_	5F		

Control char only

APPENDIX 3

CODE CONVERSION CHART (US)

ASCII TO EIA (RS244)

ASCII		EIA	
CHAR	HEX	CHAR	HEX
'	60	Control char only	
a	61	A	31
b	62	B	62
c	63	C	73
d	64	D	64
e	65	E	75
f	66	F	76
g	67	G	67
h	68	H	68
i	69	I	79
j	6A	J	51
k	6B	K	52
l	6C	L	43
m	6D	M	54
n	6E	N	45
o	6F	O	46

ASCII		EIA	
CHAR	HEX	CHAR	HEX
p	70	P	57
q	71	Q	58
r	72	R	49
s	73	S	32
t	74	T	23
u	75	U	34
v	76	V	25
w	77	W	26
x	78	X	37
y	79	Y	38
z	7A	Z	29
{	7B	Control char only	
}	7C		
~	7D		
DEL	7E	DEL	7F

Note 1 These (control) characters are only acted upon if they are defined in program mode as control characters (see section 5).

Note 2 Odd parity is always included in EIA code.

APPENDIX 4
CODE CONVERSION CHART (US)
ASCII TO 8 TRACK TELEX (RS358)

ASCII		RS-358-B	
CHAR	HEX	CHAR	HEX
NUL	00	Blank	00
SOH	01	SOH	01
STX	02	STX	02
ETX	03	STX	03
EOT	04	EOT	04
ENQ	05	ENQ	05
ACK	06	ACK	06
BEL	07	BEL	07
BS	08	BS	08
HT	09	HT	09
LF	0A	LF (NL)	0A
VT	0B	VT	0B
FF	0C	FF	0C
CR	0D	CR	0D
SO	0E	SO	0E
SI	0F	SI	0F
DLE	10	DLE	10
DC1	11	DC1	11
DC2	12	DC2	12
DC3	13	DC3	13
DC4	14	DC4	14
NAK	15	NAK	15
SYN	16	SYN	16
ETB	17	ETB	17
CAN	18	CAN	18
EM	19	EM (EUR)	19
SUB	1A	SUB	1A
ESC	1B	ESC	1B
FS	1C	FS	1C
GS	1D	GS	1D
RS	1E	RS	1E
US	1F	US	1F
SP	20	SP	20
!	21	Control char only	
"	22	" 27, 27	
#	23	Control char only	
\$	24	DLR	
%	25	%	25
&	26	AND	
,	27	,	27
(28	(28
)	29)	29
*	2A	Control char only	
+	2B	+	2B
,	2C	,	2C
-	2D	-	2D
.	2E	.	2E
/	2F	/	2F

ASCII		RS-258-B	
CHAR	HEX	CHAR	HEX
0	30	0	30
1	31	1	31
2	32	2	32
3	33	3	33
4	34	4	34
5	35	5	35
6	36	6	36
7	37	7	37
8	38	8	38
9	39	9	39
:	3A	:	3A
Control char only			
A	41	A	41
B	42	B	42
C	43	C	43
D	44	D	44
E	45	E	45
F	46	F	46
G	47	G	47
H	48	H	48
I	49	I	49
J	4A	J	4A
K	4B	K	4B
L	4C	L	4C
M	4D	M	4D
N	4E	N	4E
O	4F	O	4F
P	50	P	50
Q	51	Q	51
R	52	R	52
S	53	S	53
T	54	T	54
U	55	U	55
V	56	V	56
W	57	W	57
X	58	X	58
Y	59	Y	59
Z	5A	Z	5A
Control char only			
[5B		
\	5C		
]	5D		
`	5E		
-	5F		

APPENDIX 4
CODE CONVERSION CHART (US)
ASCII TO 8 TRACK TELEX (RS358)

ASCII		RS-358-B	
CHAR	HEX	CHAR	HEX
	60	Control char only	
a	61	A	41
b	62	B	42
c	63	C	43
d	64	D	44
e	65	E	45
f	66	F	46
g	67	G	47
h	68	H	48
i	69	I	49
j	6A	J	4A
k	6B	K	4B
l	6C	L	4C
m	6D	M	4D
n	6E	N	4E
o	6F	O	4F

ASCII		RS-358-B	
CHAR	HEX	CHAR	HEX
p	70	P	50
q	71	Q	51
r	72	R	52
s	73	S	73
t	74	T	54
u	75	U	55
v	76	V	56
w	77	W	57
x	78	X	58
y	79	Y	59
z	7A	Z	5A
{	7B		
-	7C		
~	7D	Control char only	
DEL	7E		
	7F	DEL	7F



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We reserve the right to change specifications without notice.

New Program version in Facit 4046/4047.

The new program will be in machines from following serial number:

Facit 4047: 747 0041

Facit 4046: 749 0001

The new program has the following name:

RON 105 0163

A831 R2A

4047 D11 746

How the new program works.

1. Buffer clearance.

When data is sent over the line, by reading or punching, a special sign will be shown in the display to indicate communication. When you punch the display goes back to Line, when data has been sent. When you read, and the communication stops by any reason, the display will show "Data" if there is data in the buffer. You can now clear the buffer by pressing the Stop key(*) and the display will go back to Line. If you start punching after reading and you still have data in the buffer, there will be an automatic clearance of the buffer even if you have not cleared the buffer manually. By sending to 4047 for punching the display will switch from Data, if the buffer is not cleared, to the special line communication sign.

2. DC codes.

To start the reader by DC1, you must have set protocol Xon/Xoff. In transparent mode DC1 will start the reader and transmission of data.

Punch control by DC2 and DC4 in transparent mode. There is a new type of transparent mode which you set by code 2000 in step 6/7. If you set this code the punch will start when the first DC2 is received. All characters before DC2, except DC1, which will start the reader if there is tape in the reader, will be neglected and not stored in the buffer.

When DC4 is received the punch will use this as the last character and stop punching.