

SR200 Surface Roughness Tester



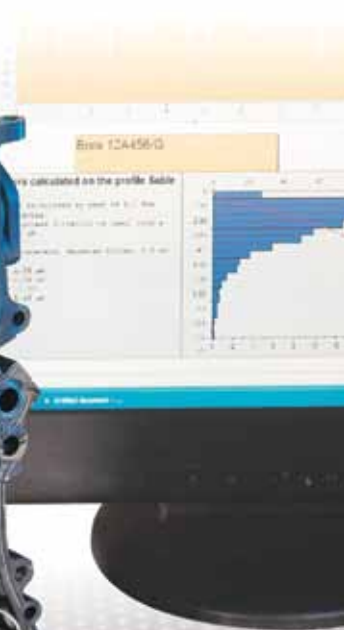
User Manual



Table Of Contents

Chapter 1		Using the SR200 with a PC	3.3
Introduction to Surface Texture		Printing	3.3
terminology and definitions	1.1	To cancel print:	3.3
Surface Texture Definitions	1.1	Chapter 4 Menu Settings	4.1
Parameter Definitions	1.2	Main Menu	4.1
Ra	1.2	Cut off	4.1
Rp	1.2	Evaluation length	4.1
RSm	1.2	Parameters	4.1
Rz	1.2	Range:	4.3
Rz1max	1.2	Range Selector Table	4.3
Rt	1.2	Print Settings:	4.3
Rmr	1.3	Units:	4.3
RPc	1.3	Filter:	4.3
Rsk	1.3	Dump Mode:	4.3
Rda	1.3	Dump Mode (Using your SR200	
Chapter 2 Description	2.1	with a PC)	4.3
The Equipment	2.1	SPC Mode	4.4
Traverse Unit	2.2	Language Settings	4.4
Pick-up Mounting Components	2.3	Chapter 5	5.1
Mounting Bracket	2.3	Making Measurements	
Adjustable Support	2.4	Technical Considerations	5.1
Pick-up holder	2.4	Operating Notes	5.1
Connector	2.4	On a horizontal surface	5.1
Pick-up	2.5	On other surfaces	5.1
Mounting	2.6	Cut off:	5.2
Chapter 3 Getting Started	3.1	Evaluation Length:	5.2
Battery	3.1	Table of Cut-off values	5.2
Connecting the Pick-up	3.1	Operating Error Indications	5.2
Making a measurement	3.2	Specification	5.3
Switching the SR200 ON	3.2	RS232 Output	5.3
To cancel a measurement	3.3	Printer Configuration	5.3

Specification for Data Dump	5.5
Chapter 6 Accessories	6.1
Chapter 7 Maintenance	7.1
Calibration	7.1
Reference Standard	7.1
Sensitivity Check and Adjustment	7.1
Cleaning the Stylus	7.1
Pick-up Skid	7.1



Chapter 1

Introduction to Surface Texture terminology and definitions

Surface Texture Definitions

Every components surface has some form of texture which varies according to its structure and the way it has been manufactured. These surfaces can be broken down into three main categories: Surface roughness, Waviness and Form. In order to predict a components behaviour during use or to control the manufacturing process, it is necessary to quantify these surface characteristics. This is done by using surface texture parameters.

Surface Texture Parameters: Can be separated into three basic types: Amplitude, Spacing and Hybrid.

Amplitude Parameters: Measures of the vertical characteristics of the surface deviations.

Spacing Parameters: Measures of the horizontal characteristics of the surface deviations.

Hybrid Parameters: Combinations of spacing and amplitude parameters.

Mean Line: Is a least squares line of nominal form fitted through the primary profile where the areas of the profile above and below this line are equal and kept to a minimum separation. Profile filters as detailed in ISO11562 define the mean lines for the roughness and waviness profiles.

Cut-off: A cut-off length (or sampling length) is a filter that uses either electronic (2CR) or mathematical (Gaussian) means to remove or reduce unwanted data in order to look at wavelengths in the region of interest.

Bandwidth: Is the ratio of the upper Cut-off (L_c) to the lower Cut-off (L_s).

Sample Length: The profile is divided into sample lengths l , which are long enough to include a statistically reliable amount of data. For roughness and waviness analysis, the sample length is equal to the selected cut-off (l_c) wavelength. The sample length is also known as the cut-off length.

Evaluation Length: The length in the direction of the X axis used for assessing the profile under evaluation. The evaluation length may contain one or more sample lengths. For the primary profiles the evaluation length is equal to the sample length.

Note: almost all parameters are defined over one sample length, however in practice more than one sample length is assessed (usually five) and the mean calculated. This provides a better statistical estimate of the parameters measured value.

Parameter Definitions

Surface texture is quantified by parameters which relate to certain characteristics of the texture. The SR200 offers the following parameters:

Ra, Rp, Rsm, Rz, Rt, Rmr, R_{Pc}, Rz1max, Rsk, Rda

Additional parameters can be analysed by downloading results to optional software.

Ra: Universally recognised, and most used, international parameter of roughness. It is the arithmetic mean of the absolute departures of the roughness profile from the mean line.

Rp: Maximum profile peak height

Mathematically, the largest peak deviation of the roughness profile from the mean line within a sampling length.

When more than one sampling length is analysed rp is the mean value of the individual rp values for each sample.

RSm: The mean spacing between profile peaks at the mean line, measured within the sampling length. (A profile peak is the highest point of the profile between an upwards and downwards crossing of the mean line).

Rz: $Rz = Rp + Rv$ and is the maximum peak to valley height of the profile within a sampling length.

When more than one Sampling Length is analysed Rz is the mean value of the individual Rz values for each Sampling Length.

Rz1max: Maximum Height of Profile

Highest peak to valley within a sampling length. When measured over several sampling lengths the largest individual sampling length value is taken.

Also known in the past as Rymax, Ry, Rmax or Rti

Rt: Total Height of the Profile.

Maximum Peak to Valley Height of the Profile in the Assessment (evaluation) Length (In).

Rmr: Material Ratio is the length of bearing surface (expressed as a percentage of the evaluation length l_n) at a depth below the highest peak.

Replaces $tp\%$ - Bearing Ratio as defined in ISO 4287 - 1984

RPc: Peak Count

The number of local peaks which project through a selectable band centred about the mean line or a line parallel to it. The count is determined only over the evaluation length though the results are given in peaks per cm (or per inch)

Known as P_c before 1997

Rsk: Skewness

Rsk is a measure of the symmetry of the profile about the mean line.

This parameter indicates whether the spikes on the surface are predominately negative or positive or if the profile has an even distribution of peaks and valleys.

Rda: R Delta a or R_{da} or RD_a - Arithmetical Mean Slope

Arithmetical Mean Slope of the Profile within the Sampling Length.

Chapter 2

Description

The SR200 is a portable, self-contained instrument for the measurement of surface texture and is suitable for use in both the workshop and laboratory. Parameters available for surface texture evaluation are:

Ra, Rz, Rt, Rp, Rmr, RPc, Rv, Rz1max, Rsk, Rda

An explanation of the surface texture parameters evaluated by this instrument is given in Chapter 1.

The parameter evaluations and other functions of the instrument are microprocessor based. The measurement results are displayed on an LCD screen and can be output to an optional printer or computer for further evaluation.

The instrument is normally powered by an alkaline non-recharge-able battery. If preferred, an optional power adaptor can be used

Figure 1



The Equipment

The standard SR200 includes:

- 1 Traverse unit
- 1 Standard Pickup
- 1 Reference Specimen
- 1 Pickup cable
- 1 Screwdriver
- 1 Battery

Note: certain items described in this handbook are optional and may not form part of your particular system.

Traverse Unit

The top panel of the traverse unit carries a membrane type control panel and a liquid crystal display. The unit houses the electronics for controlling the measurement sequence, computing the mea-

surement data and outputting the results to the display, or to the

RS232 port for use with a printer (when included) or to a com-

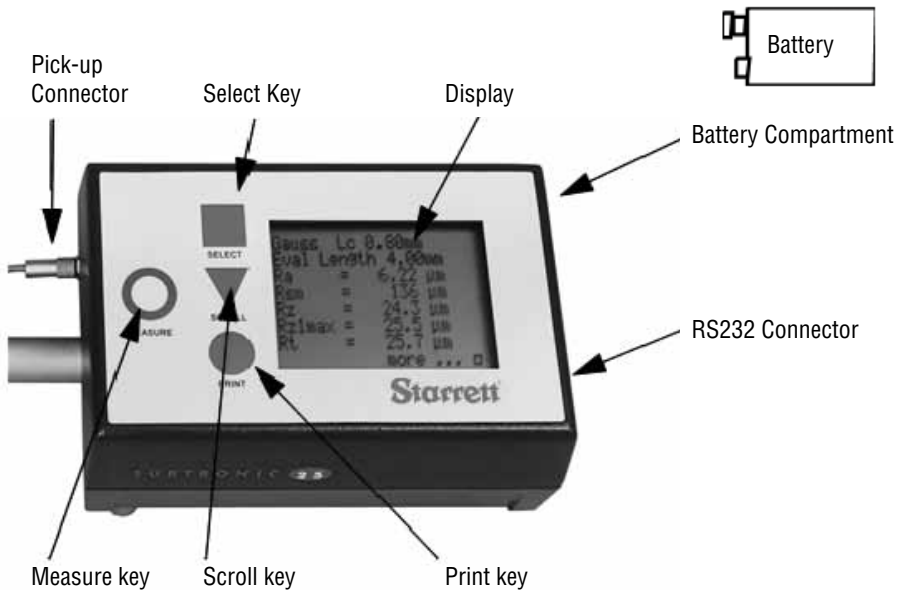
puter, for further analysis.

The unit also contains a drive motor which traverses the pickup

across the surface to be measured. The measuring stroke always starts from the extreme outward position. At the end of the measurement the pickup returns to this position ready for the next

measurement. The traverse length is determined from selections of cut-off or length.

Figure 2

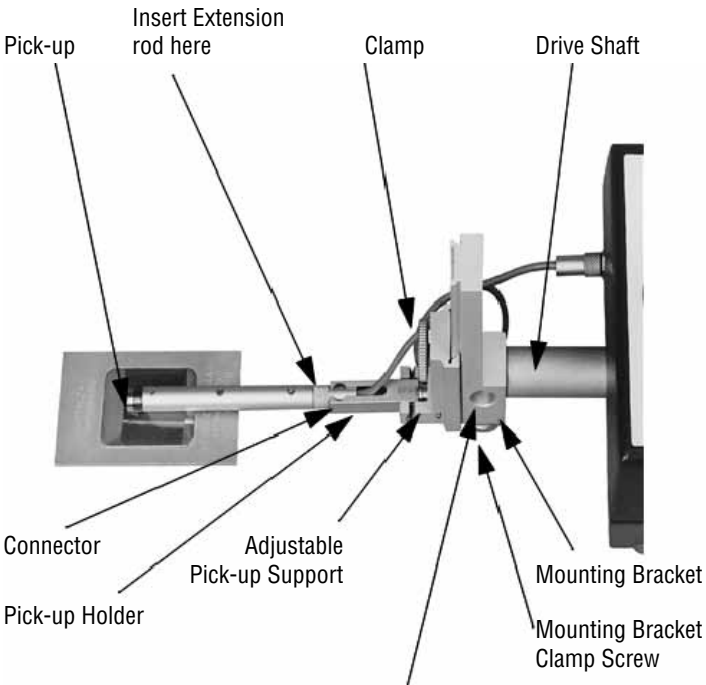


Pick-up Mounting Components

The pick-up is fastened to the drive shaft by the following means:

Mounting Bracket. This is clamped to the drive shaft by means of a knurled knob. Although normally used upright, as shown in figure 3, it can be turned to angle the pick-up or to take it off the centre line, as shown in figure 3a. It can also be mounted side-ways on the drive shaft, when the right angle pick-up is in use.

Figure 3: pick up mounting



Use this mounting position when the right angled pick-up is used

Figure 3a

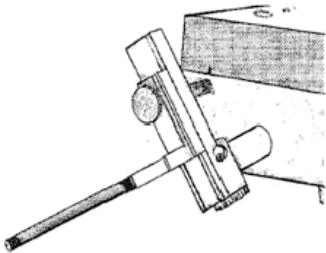
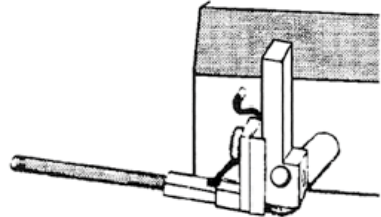


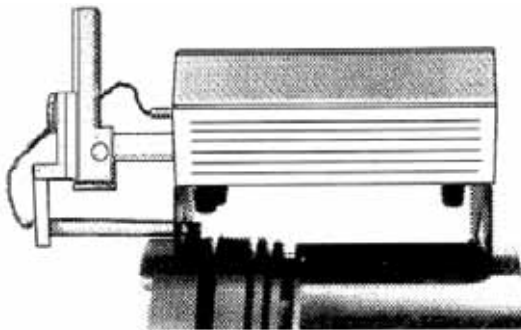
Figure 3b



Adjustable Support: This can be clamped at any position on the slide of the mounting bracket to provide pick-up height adjustment.

Pick-up holder: This fits into the crutch of the pick-up support and is held in place by a spring plunger. A biased holder, when used as shown in figure 3, exerts a biasing force on the pick-up (depending on which way the holder is inserted into the support crutch). It can also be used to position the pick-up directly underneath the display unit, as shown in figure 4.

Figure 4



The holder will hold the pick-up at right angles to the drive shaft when it is pivoted away from the surface (eg while changing the work piece).

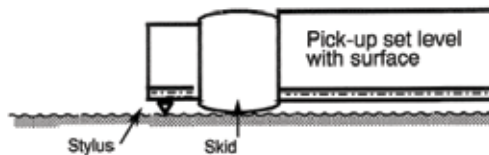
Connector: The connector of the pick-up lead is screwed into the end of the pick-up and is then inserted into the end of the pick-up holder, with the lead coming out through the slot

in the holder. It is advisable to connect the lead to the display-traverse unit first and then the pick-up. To connect the pick-up to the display-traverse unit: the pick-up has 2 threaded ends with location pins. Insert the location pin securely into the SR200 body and tighten the threaded collar.

When the extension rod is used, the short pick-up lead is not required and the end of the rod itself is inserted into the holder.

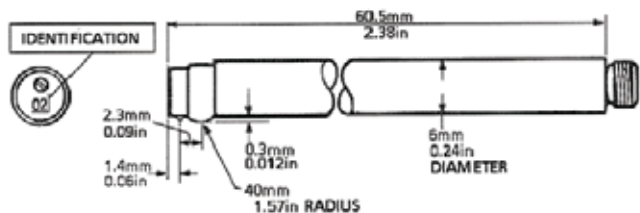
Pick-up: The pick-up is a variable inductive type transducer, which is supported on the surface to be measured by a skid, a curved support projecting from the underside of the pick-up in the vicinity of the stylus. As the pick-up traverses across the surface, movements of the stylus relative to the skid are detected and converted into a proportional electrical signal. The radius of curvature of the skid is much greater than the roughness spacing. This enables it to ride across the surface almost unaffected by the roughness, and provide a datum representing the general form of the surface. Even so, where the waviness is widely spaced it will be necessary to use the pick-up with shoe, in conjunction with the 2.5mm (0.1in) cut-off.

Figure 5: the pickup is supported on the workpiece by the skid



There are several different types of pickup available designed for different applications, details are given in the Accessories section of this handbook. They differ only in the stylus tip radius, the dimensions of the housing or position and the shape of the skid. The stylus material in all the pickups is diamond for low wear. The skids of the standard pickups are of red ruby.

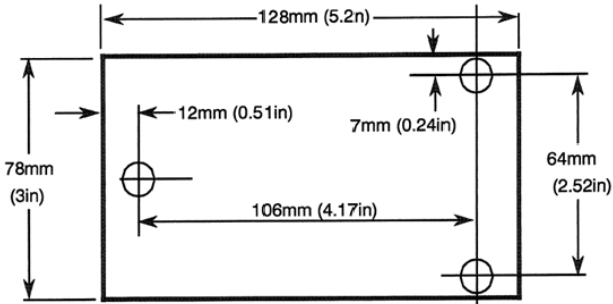
Figure 6. Standard pick-up dimensions



Mounting: On a flat surface the display-traverse unit can be supported on its three feet.

If a user wishes to make his own mounting bracket for the unit, the dimensions of the fixing holes are shown in figure 7.

Figure 7



Diameters of clearance holes:
8.2mm (0.32in) for feet
3.2mm (0.13in) for screw
Foot screws M3 thread.

Chapter 3

Getting Started

Battery

To insert a battery, open the compartment by sliding the door to the right and remove the door from the unit. Insert the battery, with the terminals positioned as shown in the diagram on the floor of the battery compartment.

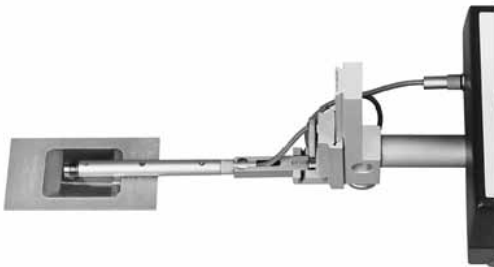
Connecting the Pick-up

Plug the lead into the socket on the front of the unit and mount the pick-up as follows: The connector of the pick-up lead is screwed into the end of the pick-up and is then inserted into the end of the pick-up holder, with the lead coming out through the slot in the holder. It is advisable to connect the lead to the display-traverse unit first and then the pick-up. To connect the pick-up to the display-traverse unit: the pick-up has 2 threaded ends with location pins. Insert the location pin securely into the SR200 body and tighten the threaded collar.

Rotate the pick-up to bring the stylus vertical; this can conveniently be done with reference to the identity number engraved at the end of the pick-up.

Position the Pickup stylus on the component to be measured, with the stylus parallel to the component (see figure 8 below). Ensure that the stylus tip is in contact with the surface (this can be verified by checking that the identity number engraved at the end of the pick-up is vertical). The skid should also be in contact with the surface.

Figure 8



Making a measurement

Note 1: If the pickup has been changed or the instrument is being used for the first time, the instrument should be calibrated (see Chapter 7).

Note 2: Successful use of the SR200 will only be possible if it is operated on a surface free from external vibration - see also operating notes in Chapter 5.

Switching the SR200 ON

Pressing the SCROLL ▼ key brings the display on and the previously selected set-up is displayed (provided power has been continuously present). The display is automatically turned off if the instrument is not used for 30 seconds.

If the battery is dead or has been removed, the previously selected set-up is lost. When a battery has been replaced and the SCROLL ▼ key is pressed, the start up message will display for 2 seconds and then the default settings are restored.

The default settings are

Parameter:	Ra
Cut-off:	0.8mm
Evaluation length:	4.0mm
Range:	100mm
Data dump evaluation length:	4.0mm
Data dump range:	100mm
No parameter/graph selected for printout	
Language	English
Filter	Gaussian

If the user wishes to change any of these settings, this can be carried out using the SCROLL ▼ and SELECT ■ keys (see Chapter 4 for more detail)

Press the MEASURE ○ key. When the measurement is completed the pickup returns and the results are displayed on the screen (see example below):

GaussLc 0.80mm
Eval Length 25.0mm
Ra = 0.00µm
Rz = 0.00µm
Rt = 0.00µm
Rp = 0.00µm
RSmm = 0.00µm
more...>

If multiple parameters have been selected they may not fit on the display. To continue viewing the remaining results, click on the SELECT ■ key.

To cancel a measurement

If Measure is pressed during a traverse, a stop and reversal without measurement will occur and Measurement Cancelled is displayed.

Using the SR200 with a PC

If the SR200 is connected to a PC then measurements will be taken in dump mode, which is selected using the SCROLL ▼ and SELECT ■ keys from the main menu (see next chapter for full set-up details). Position the Pickup stylus on the component to be measured. Measurements are then activated from the software on the PC. When the measurement is completed the pickup returns and the results are dumped directly to the PC. During transfer of the measurement data the message Data Dumping is displayed.

When the data dump is completed, the dump menu still remains active. From the displayed menu, values of evaluation length and range can be changed and further measurements for data dump can be made (see next chapter for further details).

Printing

PRINT ● key: pressing this key causes the evaluated measurement data to be output to the RS232 port. When a printer is connected, a printout of all the parameters selected in the print menu is made.

If SPC has been selected (see chapter 4) the heading is disabled.

Where the profile is longer than 80cm the printout will stop after 80cm. Pressing PRINT key can print the next 80cm. The printout will start from the beginning of the profile if SELECT is activated.

If no legal surface data is stored, the error message “Measure before print” is displayed.

To cancel print

Pressing the PRINT ● key during printout (before display has updated to Main menu state) stops the printout and “Printer cancelled” is displayed for 2 seconds. The normal update to Main-state then continues.

Chapter 4

Menu Settings

The operation of the SR200 is based on making selections from menus presented on the liquid crystal display. Two menu states exist, these are: Main Menu and Data Dump Menu. The Data Dump menu is accessed via the Main Menu and is used when connecting to a PC.

Main Menu

The Main Menu (accessed by pressing the Scroll key) is used to make the following selections:

CUT-OFF _____
EVALUATION LENGTH _____
PARAMETERS _____
RANGE _____
PRINT SETTINGS _____
UNITS _____
FILTER _____
DUMP MODE _____

The SCROLL ▼ key is used to cycle through these options and the SELECT ■ key is used to confirm the set up screen required. For a chart of default settings see Chapter 3.

Cut Off:

To select the cut-off required, select the Cut-off option from the main menu. Press the SCROLL ▼ key to toggle through the cut-off options until the required cut-off is highlighted on the screen, then press the SELECT ■ key. See chart in chapter 5 for further information.

Evaluation Length.



To select the evaluation length required, select this option from the main menu. Press the SCROLL ▼ key to toggle through the evaluation length options until the required length is highlighted on the screen, then press the SELECT ■ key.

The evaluation length options are determined by the cut-off length selected.

Parameters:

select the Parameters option from the main menu. A list of the parameters available will appear

on the screen (see below). Press the SCROLL ▼ key left to right across the columns then press the SELECT ■ key for each parameter required (multiple selections can be made). The SELECT ■ key is also used to de-select a parameter.

	Ra	RSm
	Rz	Rz1max
	Rt	Rsk
	Rmr >>>	settings
	Rpc >>>	settings
		Exit

When selecting the Rmr and Rpc parameters, additional settings need to be specified. SCROLL ▼ onto “Settings” then click on the SELECT ■ key. The following screen will appear:

Rmr	settings
Mr	% + Offset
Mean line	+ Offset
Exit	

The SCROLL ▼ key will cycle through ‘Mr% + Offset’, ‘Mean line + Offset’ and ‘Exit’. The SELECT ■ key will allow the alteration of one of the 2 settings or, if Exit is highlighted, will return to the main parameter selection screen.

Pressing SCROLL ▼ will step the cursor (or highlighted character) through the 3 decimal digits of the percentage, then the sign and 3 decimal digits of the offset and then to OK. Pressing SELECT ■ will change the sign/digit - keep pressing SELECT ■ until the required figure is reached. Pressing SCROLL ▼ saves the change and moves the cursor along to the next decimal digit. When complete Select OK to return to the previous menu.

Rmr	Settings
Mr%	001%
Offset	+00.0µm
	OK

The following screen is displayed for Rpc settings and is amended in the same way as above.

Rpc	Bandwidth
00.0µm	
OK	

Range:

Allows the user to scroll through the range options. The most common settings are as follows:

For surfaces <10 micron peak to valley- select range of 10µm

For surfaces <100 micron peak to valley- select range of 100µm

For surfaces <300 micron peak to valley- select range of 300µm

Range Selector Table

Parameter Resolution Resolution at 10µm range at 100µm range at 300µm range

Ra	0.01µm	0.01µm	0.1µm
Rp	0.01µm	0.1µm	1.0µm
Rz	0.01µm	0.1µm	1.0µm
Rz1max	0.01µm	0.1µm	1.0µm
Rt	0.01µm	0.1µm	1.0µm
Rmr	0.1%	0.1%	0.1%
Rpc	1 decimal point	1 decimal point	1 decimal point
Rsk	0.001µm	0.001µm	0.001µm
Rda	0.1 deg	0.1 deg	0.1 deg
Rsm	1.0µm	1.0µm	1.0µm

Print Settings:

Allows selection of print options. User can choose to print any combination of graph, parameters and header information. The scale of the graph can also be selected. SCROLL ▼ through and press the SELECT ■ key for each item required - a tick will appear alongside the item.

Units:

Allows imperial or metric units to be selected.

Filter:

Allows filter options of either Gaussian or 2CR (see explanation in Chapter 1).

Dump Mode:

This menu mode is used if connecting the SR200 to a PC (see below)

Dump Mode (Using your SR200 with a PC)

If using the SR200 with a PC you will need to select the DUMP MODE option from the main menu. Scroll to Dump mode ON. Each time the SR200 is switched on, the following dump mode menu options will be available:

EVALUATION LENGTH _____
 RANGE _____
 UNITS _____
 FILTER _____
 DUMP MODE _____

All other settings are carried out via the PC.

SPC Mode

If SPC is required, this can be switched on by pressing the PRINT ● and SCROLL ▼ key down simultaneously. The following warning screen will appear:

Warning	
Changes to the following settings are for advanced functions only	
Quit	OK

Selecting OK displays the Select language and select SPC mode screen. Select the SPC Mode then SCROLL ▼ will toggle the mode between ON and OFF. When SELECT ■ is pressed with OK selected the previous screen will be shown again.

S	PC	ModeON
OK		

Language Settings

The default on the SR200 is English Language. If the user wishes to select other languages, press the PRINT ● and SCROLL ▼ key down simultaneously. The following warning screen will appear:

Warning	
Changes to the following settings are for advanced functions only	
Quit	OK

Selecting OK displays the Select language and select SPC mode screen.

Select	Language
Select	SPCmode
	Quit

SCROLL ▼ down the options and SELECT ■

Select	Language
	English
	Français
	Deutsch
	Italiano
	OK

SCROLL ▼ down the list of languages with and SELECT ■. This selection will remain as the default unless power is lost (eg battery is removed).

Chapter 5

Making Measurements - Technical Considerations

Operating Notes

Before measurements are made, there are a few general points of procedure which should be observed.

1. The surface to be measured must be free from vibration and the instrument must be completely steady during a measurement.
2. Always turn the pick-up so that the stylus is visibly perpendicular to the surface to be measured.
3. Set the display-traverse unit so that the traverse is made parallel to the surface being measured.
4. After a measurement, the traverse unit can be removed from the surface as soon as the pick-up completes its return stroke. The display will remain visible.
5. Where the texture of a surface has a predominant directional character (LAY), it is usual to traverse across the lay, not along it.

On a horizontal surface

1. Use the biased pick-up holder on the display-traverse unit
2. Clean the surface to be measured, so that it is free from abrasive material, grease, suds etc. This is necessary to ensure accurate readings and to reduce wear on the skid.
3. Make the cut-off/length and parameter selections required
4. Position the display-traverse unit and pick-up so that the stylus contacts the surface and the pick-up is approximately parallel to the surface. Make sure that the length of surface is sufficient for measurement, remembering that the traverse motion is inwards towards the display-traverse unit.
5. Press the Measure key. When the traverse is completed, the results are displayed and the pick-up returns to its extreme outward position.
6. If an error message is displayed, identify the cause, correct it and repeat the measurement.

On other surfaces

On a vertical surface: if necessary, hold the display-traverse unit by hand on the surface, making sure that it does not move during the measurement.

In a small deep bore: Fit the optional extension rod between pickup and holder.

Cut off

A few trial measurements made on different surfaces will soon demonstrate that on some, the results obtained are very dependent upon the cut-off selected. This shows that it is important to choose the cut-off to suit the surface. In general, fine surfaces require short cut-offs and rough surfaces a longer one. The table on the following page gives some guidance on suitable cut-offs.

Evaluation Length

A long evaluation length is mainly for use on sheet metal and similar materials, where a longer surface is required to be representative of the material being examined.

Table of Cut-off values

If not otherwise indicated on a drawing, the following should be used to determine the cut-off λ_c (ISO4288)-1996. Recommended Cut-off ISO 4288-1996

Periodic Profiles	Non-periodic Profiles		Cut-offs	Sampling Length/ Evaluation Length
Spacing Distances S_m (mm)	Rz(μm)	Ra (μm)	λ_c (mm)	λ_c/L (mm)
>0.013 to 0.04	(0.025) to 0.1	(0.006) to 0.02	0.08	0.08/0.4
>0.04 to 0.13	>0.1 to 0.5	>0.02 to 0.1	0.25	0.25/1.25
>0.13 to 0.4	>0.5 to 10	>0.1 to 2	0.8	0.8/4
>0.4 to 1.3	>10 to 50	>2 to 10	2.5	2.5/12.5
>1.3 to 4	>50 to 200	>10 to 80	8	8/40

Operating Error Indications

During a measurement a message may be displayed which indicates that an error condition has occurred. The messages and the probable causes for their display are as follows:

Display	Reason for message
Motor Error	Motor fault
Pick-up Error	Response at pick-up level error or faulty connection
Over range	Selected range too small
E	Can occur in front of a measured value due to excessive slew rate for a single data point (large spike). May also occur if the pick-up is lifted off the surface
Data transmit error	Printer connected at start of transmission but later detected as not connected (printer off line)
Battery low	When battery voltage <6.4V: key push operations are disabled and display is off. When the instrument is in the sleep mode and the MEASURE \odot key is pressed, then "Battery low" is displayed for 2 seconds, followed by the normal display or operation. Stored surface profile is erased Renew or recharge battery

Measure before print	pressing PRINT ● key before measurement
No parameter selected	pressing PRINT ● key before selecting printout parameters
Printer not connected	pressing PRINT ● key when printer not connected or no computer connected to receive dump data.
Printing cancelled	pressing PRINT ● key during data transmission to printer (stop printing). Message displayed for 2 seconds.
Measurement cancelled	Pressing MEASURE ○ key during traverse (stop traverse)
Measure before data dump	Attempted data dump before measurement

Specification

Battery	Alkaline: minimum 600 measurements of 4mm measurement length Ni-Cad: minimum 200 measurements of 4mm measurement length Size: 6 LR 61 (USA/Japan)
Traverse Speed	1mm/sec
Measurement	metric/inch units
Cut-off values	0.25mm, 0.8mm and 2.5mm (0.01in, 0.03in and 0.1in)
Traverse lengths	0.25-25mm (0.05-0.98in)
Display	LCD-matrix, 8 lines x 20 characters, alphanumeric 9 pin D-connector female. Containing RS232 hardwired handshake (RS232 level).
	Transmit function only hardware implemented.
Accessory socket	Remote start (5V logic) Remote start: short to ground. Constant power on instrument (5V logic) When connected to Ground, constant power is on

RS232 Output

Printer Configuration

If SPC is on	
Baud rate	4800 Baud
Parity	Even
Data bit length	7 bits
Printer head disabled	

If SPC is off	
Baud rate	9600 Baud
Parity	Odd
Data bit length	8 bits
Printer head enabled	

Output to printer (in ASCII characters) or pre-selected parameters and provided that G is pre-selected, a readout of dc corrected surface profile.

Language of printout same as language of display

The printout heading is shown below:

Starrett	_____
SR200	_____
Operator:...	_____
Date:	_____
Object:	_____
Cutoff	= xxx mm
Evaluation length	= xxx mm
Filter	= xxx

Specification for Data Dump

The following format is used for data dump from SR200 to a PC.

Transmission set up is as follows:

Baud rate:	9600 Baud
Number of data bits	8
Start bit:	1
Stop bit:	1
Parity:	None

Resolution	Horizontal	Vertical
	0.5µm for Evaluation Length 8mm	10nm
	1.0µm for Evaluation Length >8mm	
Evaluation length selectable	0.25mm, 0.8mm, 1.25mm, 2.5mm, 4.00mm, 8.0mm, 12.5mm. 25.0mm	
Range selectable	10µm, 100µm, 300µm	
Transmission	RS232	
Transmitted data is unfiltered	No parameters are calculated	
Transmission data		

Data type	Function	Comments
2 bytes	Number of data values	Total number of transmitted data values
1 byte	Ordinate spacing	Number of data values per mm
1 byte	First data value	Resolution 10nm
1 byte	Diff data value	Difference between this and the previous data value
#80	Stop byte	2 stop bytes are sent
#80	Stop byte	Making it possible to test for all data values received

The total number of transmitted data bytes are, number of data values +5

The data value can be calculated from, data value (n) = date value (n-1) + diff data value (n), n1.

Chapter 6

Accessories

Replacement Standard pick-up (SR-112-1503)

Details as the standard pick-up, (see figure 6 pg 2.5) 10mm (400 μ m) stylus tip radius. Conforms to US specifications (ANSI B46.1).

Small bore pick-up, 5 μ m (200 μ in) stylus tip radius (SR-112-1504)

For general use in small bores, on narrow surfaces and in grooves, or with the skid supported independently of the surface being measured. On this pick-up the skid is integral with the stylus arm housing and is set further back from the stylus. This enables the pick-up to be used in short bores with the skid supported independently of the surface being measured, eg by the datum support stand.

Figure 9: The small bore pickup

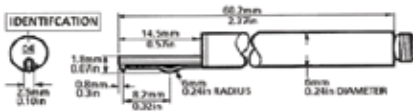
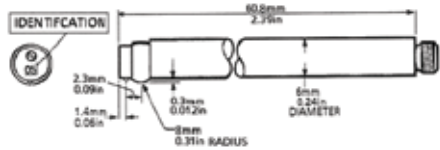


Figure 10: The right angle pickup

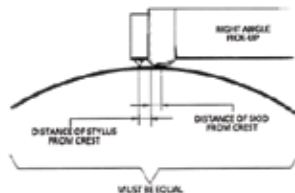


Right Angle Pick-up, 5 μ m (200 μ in) stylus tip radius (SR-112-1505)

This pick-up is used at right angles to the direction of traverse. Accordingly the skid is set at right angles to its normal position.

It is particularly useful in grooves or slots where the lay of the surface texture makes it unsuitable for measurement with a standard or small bore pick-up. When used on cylindrical workpieces it is important that the stylus and skid should be equidistant from the crest (see figure 11), and that the work piece is positioned so that the crest is parallel to the line of traverse.

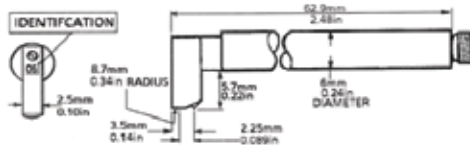
Figure 11: Conditions to be observed when the right angle pick-up is used on a cylindrical work-piece



Recess pick-up, 5µm (200µin) stylus tip radius (SR-112-1506)

This pick-up has an extended stylus and skid for measuring at the bottom of a recess, or between shoulders and flanges up to 5.7mm deep. A special deep recess pick-up is available for measuring up to a depth of 25mm.

Figure 12: The recess pickup



Extension rod (SR-112/1510)

200mm long extension with integral lead, fits between the pick-up and carriage. The extension rod is fitted to the pick-up in the following manner:

1. Disconnect the pick-up lead from the traverse unit and remove the pick-up from the traverse unit carriage.
2. Remove the lead from the pick-up
3. Carefully locate the central pin of the extension rod with the hole in the pick-up and screw the rod and pick-up together.
4. Thread the lead from the extension rod through the hole provided in the back plate of the traverse unit and connect it to the traverse unit socket.
5. fit the pick-up into the traverse unit carriage, positioned as required.

Power Adaptor

SR-112-3530	Power Adaptor (UK)	SR200
SR-112-3531	Power Adaptor (US-110V)	SR200
SR-112-3532	Power Adaptor (EURO-230V)(2 PIN)	SR200

Chapter 7

Maintenance Calibration

Reference Standard

The sensitivity of the instrument is checked with the reference specimen supplied. This comprises a ruled surface having an Ra value accurate to within 4% of the value marked on its mount.

To provide confidence in results, it is recommended that a sensitivity check is made at the beginning of each shift.

Sensitivity Check and Adjustment

The procedure for checking and adjusting the pick-up sensitivity is as follows:

1. Place the reference specimen on a flat surface and set up the instrument to make a traverse across it. Make sure that the traverse unit body is parallel to the surface of the standard and that the stylus traverses at right angles to the lay of the grooves.
2. Select the 0.8mm or 0.03in cut-off and the Ra parameter.
3. Make a measurement of the reference specimen and compare the Ra value from the display with that marked on the specimen.
4. If it differs by more than 2% use the small screwdriver to turn the sensitivity adjuster. This is located through the hole which is located in the front panel of the Display Unit, just above the pick-up connector.
5. Repeat the measurement and adjustment, until the measured value is within 2% of the value marked on the specimen.

Cleaning the Stylus

Occasionally clean the stylus with a camel hair brush moistened with a proprietary cleaning agent.

Pick-up Skid

To reduce the effect of wear, on pick-ups with a rotatable skid, occasionally turn the skid round to present a new contact surface. The skid is clamped by the screw in the front of the pick-up.

When loosening this screw, take care not to let the retaining pin next to the skid fall out. When retightening the screw, ensure that the end cover is correctly positioned with respect to the stylus and that the stylus is free to move.