

## CHAPTER 11

# THE DENTAL SURVEYOR AND ITS USES

### INTRODUCTION

The DENTAL SURVEYOR is a paralleling instrument used in construction of a prosthesis to locate and delineate the contours and relative positions of abutment teeth and associated structures.<sup>1</sup> It is an instrument used to determine the relative parallelism of two or more surface of teeth or other parts of a cast of a dental arch. The idea of the dental surveyor was introduced in 1918<sup>2</sup> and the first surveyor developed specifically for use in prosthodontics was made commercially available in 1921.<sup>3</sup>

### TYPES OF SURVEYORS

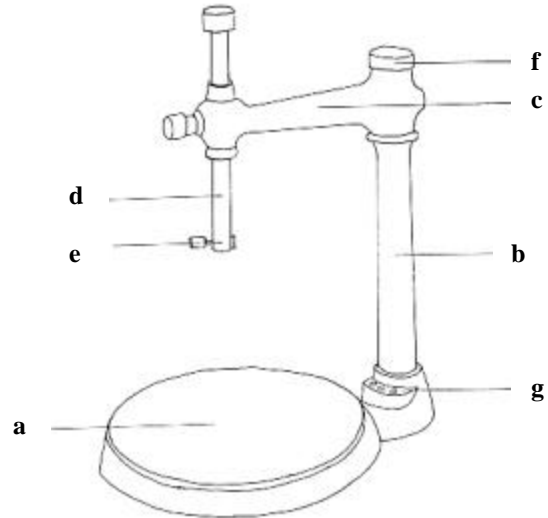
There are two types of dental surveyors: electronic and mechanical. The electronic surveyors are complicated and expensive and their use is restricted to research and large commercial dental laboratories. They will not be discussed in these lecture notes.

Mechanical surveyors are relatively inexpensive and easy to use. Every dentist learns to use a surveyor as a student in dental school and should continue to use one in practice if he or she is constructing RPDs and/or FPDs.

Several manufactures produce mechanical surveyors. Although these surveyors have slight construction differences, they are basically the same and are used in a similar manner to produce identical results. The choice of which dental surveyor to use is a matter of personal preference and availability.

### PARTS OF A SURVEYOR

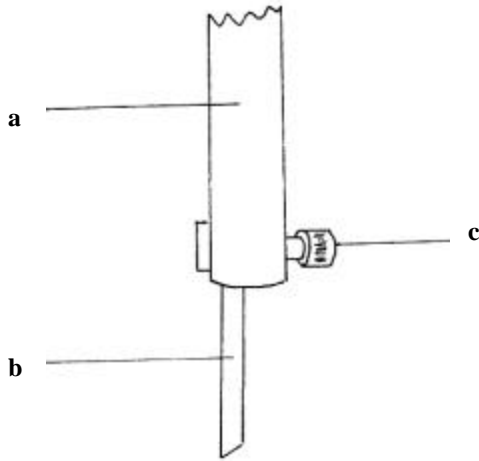
A mechanical surveyor consists of three major parts: the surveyor, a cast holder, and various surveying tools (Fig. 11-1).



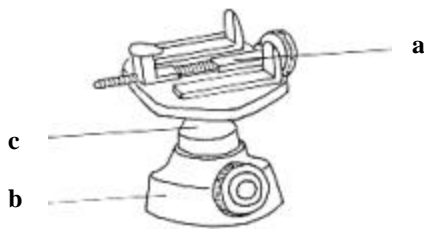
**Fig. 11-1.** ■ A mechanical dental surveyor, a) platform, b) vertical column, c) cross arm, d) the vertical spindle, e) chuck, f) tool storage compartment, g) tool storage rack.

The surveyor consists of a:

1. PLATFORM on which the cast holder sits.
2. Vertical COLUMN which supports the cross arm.
3. CROSS ARM from which the vertical spindle is suspended.
4. Vertical SPINDLE with a chuck at its inferior end.
5. CHUCK, at the inferior end of the spindle, in which various surveying instruments may be secured (Fig. 11-2).



**Fig. 11-2.■** The chuck, a) vertical spindle, b) surveying tool, c) tool securing thumb screw.



**Fig. 11-3.■** The cast holder, a) cast clamp, b) base, c) ball joint.

The cast holder consists of a (Fig. 11-3):

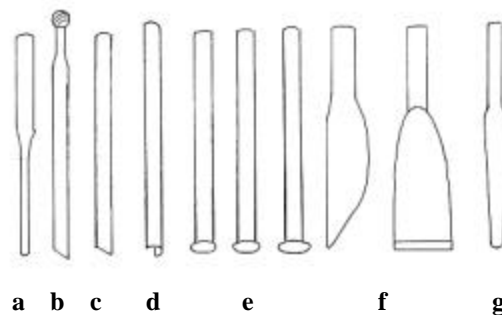
1. **CAST CLAMP** by which a cast is secured to the cast holder.
2. **BASE** which supports the cast clamp and rests on the platform of the surveyor.
3. **BALL JOINT** which allows the cast clamp to rotate into various positions in relation to the base.

There are various tools used with a dental surveyor. Each has a specific function. Some of these tools are (Fig. 11-4):

1. An **ANALYZING ROD** is a parallel sided rod. It is used to analyze the relative parallelism of two or more

surfaces of a cast and to mark survey lines on wax patterns.

2. **UNDERCUT GAUGES** are parallel sided rods with lips or heads of specific sizes. They are used to measure the depth of undercuts.
3. **WAX CARVING KNIVES** are sharp-edged tools used to contour wax patterns.
4. A **CARBON MARKER** is a parallel sided carbon rod used to mark the survey line on a cast or a crown on a cast.
5. The **PROTECTIVE SHEATH** is a metal sheath used with the carbon marker to protect it from fracture when it is secured in the chuck.
6. **BLOCKOUT TOOLS** are rods with sides having a specific degree of taper. They are used to make a specific degree of blockout of undercuts when blocking out and relieving a cast for denture construction.



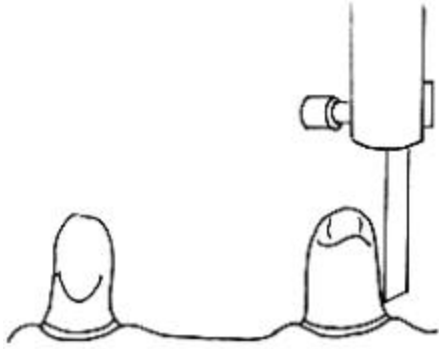
**Fig. 11-4.■** Surveying tools, a) analyzing rod, b) a straight handpiece bur shank which has been beveled and may be used as an analyzing rod and wax carver, c) beveled carbon marker, d) protective sheath for carbon marker, e) undercut gauges, f) wax carving knives, g) tapered blockout tool.

## USES OF A DENTAL SURVEYOR

The dental surveyor has many uses:<sup>4</sup>

### 1. VERIFYING THE PARALLELISM OF TOOTH PREPARATIONS

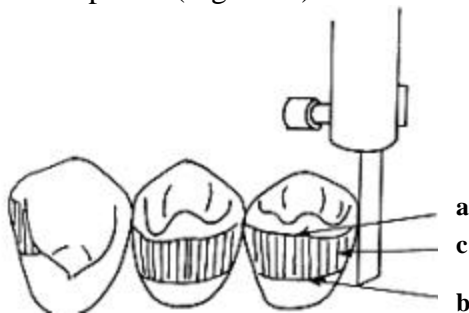
The parallelism of FPD tooth preparations can be evaluated using the dental surveyor (Fig. 11-5).



**Fig. 11-5.** ■ Verifying the parallelism of FPD tooth preparations.

### 2. SURVEYING DIAGNOSTIC CASTS

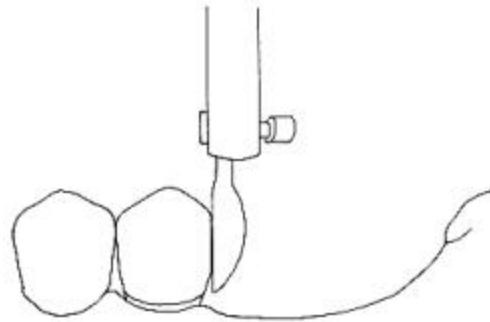
One of the primary uses of the dental surveyor is to survey diagnostic casts to (1) identify the contours of teeth and soft/hard tissues when designing RPDs, (2) plan the modifications of teeth and soft/hard tissues for the RPD, and (3) verify that these preparations have been adequately completed (Fig. 11-6).



**Fig. 11-6.** ■ Surveying a diagnostic cast to determine the modifications of tooth contours necessary for the RPD, a) current survey line, b) desired survey line, c) area of tooth to be reshaped to produce the desired survey line.

### 3. CONTOURING WAX PATTERNS FOR CROWNS

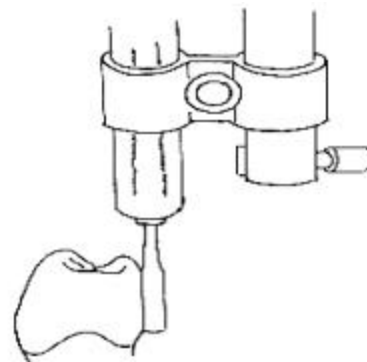
Wax patterns for crowns can be contoured with specific shapes using the dental surveyor (Fig. 11-7). This is particularly valuable when constructing crowns for abutment teeth for RPDs. These are called **SURVEYED CROWNS** and must have specific shapes for the clasp or attachment to be used on the RPD.



**Fig. 11-7.** ■ Contouring a wax pattern.

### 4. CONTOURING CROWNS

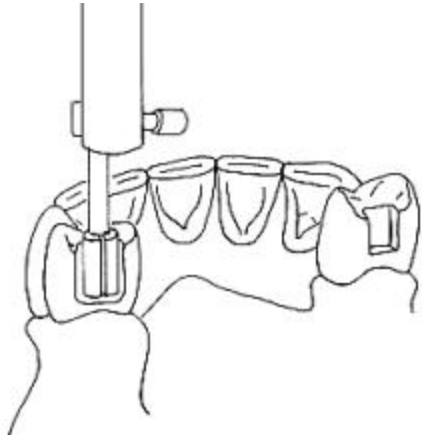
Metal and porcelain crown surfaces can be contoured to achieve specific shapes using a bur in a handpiece secured to the vertical spindle of the dental surveyor. The process of shaping crown surfaces parallel to the path of placement of the RPD using a bur is called **MILLING** (Fig. 11-8).



**Fig. 11-8.** ■ Milling a surveyed crown.

5. **WHEN USING PRECISION AND SEMIPRECISION ATTACHMENTS**

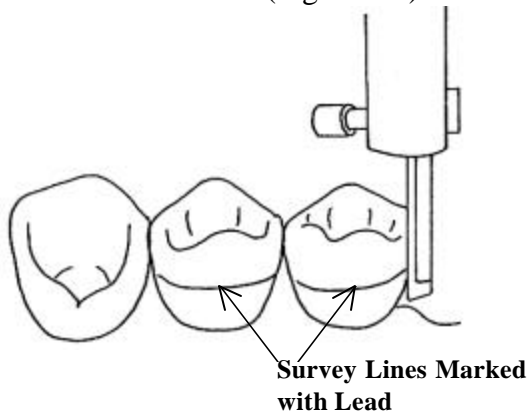
The dental surveyor is used to align precision and semiprecision attachments (Fig. 11-9).



**Fig. 11-9.** ■ Aligning an internal precision attachment.

6. **DESIGNING THE RPD FRAMEWORK ON THE MASTER CAST**

The dental surveyor is used to mark the survey lines and undercuts on the master cast prior to outlining the RPD framework (Fig. 11-10).

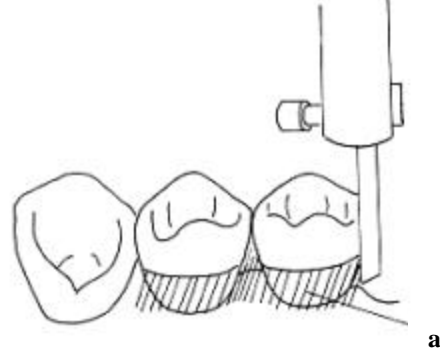


**Fig. 11-10.** ■ Marking survey lines on a RPD master cast.

7. **BLOCKING OUT THE MASTER CAST**

The surveyor is used to block out the undesirable undercuts on the master

cast as a step in production of the RPD framework (Fig. 11-11).



**Fig. 11-11.** ■ Blocking out the undercuts on a master cast, a) blockout wax.

**REFERENCES**

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2. Nichols I G. Prosthetic dentistry. St. Louis: C V Mosby, 1930:
3. Cummer W E, Turner C R, Anthony L P. Partial denture service, in the American textbook of prosthetic dentistry. 6th ed. Philadelphia: Lea and Febiger, 1932:
4. Applegate O C. The use of the paralleling surveyor in modern partial denture construction. JADA 1940; 27:1397-?