ing section for detecting an angle of the scanning light; and a memory section for storing a plurality of reference values of different levels, wherein the measuring section measures the scanning light cut-off region by comparing the result of receiving light by the light receiving element with one reference value selected from the plurality of reference values stored in the memory section according to the angle of the scanning light detected by the angle detecting section.

[0010] Another optical scanning-type touch panel according to the present invention has the above-described structure, and is designed to select a large reference value when the angle of the scanning light is small and to select a small reference value when the angle of the scanning light is large.

[0011] Still another optical scanning-type touch panel according to the present invention has the above-described structure, and is designed such that the angle detecting section includes an optical scanning start detector for detecting the start of optical scanning and a timer having the function of measuring time, and the optical scanning start detector detects the angle of the scanning light according to an elapsed time measured by the timer from a time at which the start of optical scanning was detected by the optical scanning start detector.

[0012] Yet another optical scanning-type touch panel according to the present invention has the above-described structure, and is designed such that the optical scanning start detector detects the timing of starting reception of light of not lower than a predetermined level by the light receiving element as the optical scanning start timing.

[0013] In the optical scanning-type touch panel of the present invention, when the level of light received by the light receiving element is greater than a predetermined threshold value, it is judged that the scanning light was reflected by the light retro-reflecting member and received by the light receiving element, and the region is judged not to be the scanning light cut-off region formed by the indicator, while when the level of light received by the light receiving element is smaller than the predetermined threshold value, it is judged that the scanning light was cut off by the indicator, the region is measured as the scanning light cut-off region formed by the indicator, and the indicator's position and size are calculated according to the results of the measurement.

[0014] Here, in the optical scanning-type touch panel of the present invention, the threshold value used as the reference in judging whether the region is the cut-off region is varied according to the scanning angle. In other words, the threshold value is set to a large value for a small scanning angle at which there is a possibility that a part of the scanning light is directly incident, while the threshold value is set to a small value for a large scanning angle. With this settings, since the threshold value is set in consideration of the direct incident light, the accurate cut-off region can be measured, thereby obtaining accurate values for the position and size of the indicator which are calculated based on this cut-off region.

[0015] Further, if the angular velocity of rotation of an optical scanner (for example, polygon mirror) is constant, since the scanning angle is proportional to the rotation time, the scanning angle is detected based on the elapsed time from the start of scanning, and thus the accurate scanning angle is readily detectable.

BREIF DESCRITPTION OF THE DRAWINGS

[0016] **FIG. 1** is a schematic diagram showing the basic structure of an optical scanning-type touch panel of the present invention,

[0017] **FIG. 2** is a schematic diagram showing the internal structure of light send/receive units and optical paths,

[0018] **FIG. 3** is a block diagram of the optical scanning-type touch panel of the present invention,

[0019] **FIG. 4** is a block diagram showing an example of the structure of a light receiving signal detector,

[0020] **FIG. 5** is a schematic diagram showing a state of implementing the optical scanning type touch panel of the present invention,

[0021] **FIG. 6** is a waveform chart showing a waveform of a light receving signal and a waveform of its comparative output signal when an indicator is not present,

[0022] **FIG. 7** is a waveform chart showing a waveform of a light receiving signal and a waveform of its comparative output signal when an indicator is present,

[0023] **FIGS. 8A and 8B** are timing charts showing variations of the level of the light receiving signal,

[0024] **FIG. 9** is a schematic diagram showing the principle of triangulation for detecting a coordinate,

[0025] **FIG. 10** is a schematic diagram showing the indicator and the cut-off region,

[0026] **FIG. 11** is a timing chart showing the relationship between the light receiving signal, scanning angle and scanning time, and

[0027] **FIG. 12** is a schematic diagram showing the principle of measurement of a cross-section length.

BEST MODE FOR IMPLEMENTING THE INVENTION

[0028] Hereinafter, the present invention will be described in detail with reference to the drawings illustrating an embodiment thereof. **FIG. 1** is a schematic diagram showing the basic structure of an optical scanning-type touch panel of the present invention.

[0029] In **FIG. 1**, the reference numeral **10** is a display screen of a CRT, flat display panel (PDP, LCD, EL, etc.) or a projection-type image display device of electronic equipment such as a personal computer, and the present embodiment is constructed as the display screen of a PDP (Plasma Display Panel) having display dimensions of 92.0 cm in a horizontal direction×51.8 cm in a vertical direction and 105.6 cm diagonally.

[0030] Light send/receive units **1***a* and **1***b* having therein an optical system including a light emitting element, light receiving element, polygon mirror, etc. are provided respectively on the outside of both corners of one short side (the right side in this embodiment) of the rectangular display screen **10** that is the extent of a plane specified as a target area to be touched by an indicator (blocking object) S, for example, a finger or a pen. Moreover, a recurrence reflection sheet **7** is provided on the outside of three sides other than the right side of the display screen **10**, namely, the upper and lower sides and the left side. These parts are arranged so as