To this end, the subject of the invention is an acoustic module for an acoustic antenna for receiving submarine waves, produced in the form of a panel of polychloroprene-based rubber, said module incorporating a plurality of longitudinal tubular ducts extending along the length of the rubber panel and being spaced apart along the width of the rubber panel, said longitudinal ducts receiving columns of hydrophones spaced apart lengthwise, said rubber panel also incorporating at least one transverse duct extending along the width of said rubber panel, said longitudinal and transverse ducts being filled with a fluid and said acoustic panel being provided with means for blocking said ducts in a seal-tight manner, the hardness of the rubber and the thickness of the panel being chosen such that the acoustic module exhibits a first degree of freedom in bending about an axis extending lengthwise and a second degree of freedom in bending about an axis extending widthwise.

Advantageously, the transverse duct crosses the longitudinal ducts.

Advantageously, said ducts are filled with a liquid.

Advantageously, the transverse duct conveys electrical connection cables used to establish an electrical link between hydrophones and electrical connection elements arranged at an end of the transverse duct, the electrical connection elements being intended to cooperate with a processing unit for processing the signals from the hydrophones.

Advantageously, a processing unit for processing the signals from the hydrophones is incorporated at one end of one of said ducts.

Advantageously, the hardness of the rubber, the thickness of the panel and the arrangement of the ducts are chosen such that the acoustic panel can be bent with a first minimum bending radius of between 1 m and 2.5 m about an axis extending along the length of said panel and with a second minimum bending radius of between 1 m and 2.5 m about an axis extending along the width of the panel.

Advantageously, the rubber exhibits a Shore hardness of between 60 and 80 Shores A.

Advantageously, the panel has a thickness of between 5 cm and 15 cm.

Another subject of the invention is an acoustic antenna for receiving submarine waves for passive sonar comprising a set of acoustic modules according to the invention.

In one embodiment, the antenna is tubular.

Advantageously, the antenna is tapered.

Advantageously, the antenna comprises a drum and the acoustic modules bear against said drum.

As a variant, the antenna comprises a bottom ring and a top ring that are coaxial, and ~~in which~~ the acoustic modules are fixed to the bottom and top rings and are arranged in such a way as to form, between the two rings, a tubular self-supporting drum, the panels extending lengthwise between the bottom ring and the top ring.

The tubular antenna can be cylindrical.

In this variant, the acoustic modules are advantageously arranged in such a way that the columns of hydrophones extend along respective generatrices of a single cylinder.

In another embodiment, the acoustic modules are fixed onto the front part of the hull of a submarine.

Advantageously, the acoustic modules block a mouth formed in the front part of the hull of a submarine.

Another subject of the invention is an acoustic antenna for receiving submarine waves, comprising a succession of acoustic modules according to the invention, the modules being mounted to bear against a hull of a submarine, said acoustic modules being arranged in such a way as to extend according to their width substantially parallel to the axis of the submarine.

Other features and advantages of the invention will become apparent on reading the following detailed description, given as a nonlimiting example and with reference to the attached drawings in which:

- figure 1 schematically represents an acoustic module according to the invention,

- figure 2 schematically represents a cross section along a plane M of a portion of an acoustic module according to the invention,

- figure 3 schematically represents, in perspective, the top right portion of the acoustic module of figures 1 and 2,

The long edges 5 of two adjacent panels 1 face or are advantageously attached to one another as represented in figure 6.

The acoustic modules 1 are installed in such a way as to extend along their width l substantially parallel to the axis x of the submarine.

The wall 201 of the submarine 202 is then dished between the two small edges 6 of each of the modules 1 which necessitates a degree of freedom in bending of these panels 1 about an axis extending along their width.

The modules 1 are mounted on the wall 201 of the submarine by means of conventional mounting means ~~as~~ for a person skilled in the art such as mounting bands arranged in such a way as to extend along the length L of the panels and such that the modules 1 are sandwiched between the bands and the wall of the submarine. Ducts can be provided that extend along the thickness of the panels and receive inserts passing through the panel from side to side through its thickness. The link between the modules 1 and the wall 201 is advantageously established by means of studs passing into the inserts.

The same mounting means can be used for the tubular antennas presented previously and the antennas presented hereinbelow.

Because of the second degree of freedom in bending, the modules 1 can be installed on submarines that have different radii of curvature provided that they have radii of curvature at least equal to the second minimum bending radius.

Moreover, because of the two degrees of freedom in bending, the modules 1 can be installed on submarines that have variable radii.

These degrees of freedom also make it possible to produce tapered tubular antennas with a base that is circular or not by means of these modules. In the tapered antennas with circular base, the generatrices are positioned on a cone. These antennas are obtained by positioning the modules 1 on a tapered drum or else between two rings just like the tubular antennas. The modules 1 are positioned in such a way that the columns 40 extend along said generatrices.

Moreover, as represented in figure 8, the submarines 302 conventionally comprise a hull 301 comprising a mouth 303 in the front part