

DESCRIPTION

INTEGRATED AND DETACHABLE PORTABLE SATELLITE COMMUNICATION STATIONS

BACKGROUND OF THE INVENTION

Field of the Invention

5 The present invention relates to a satellite communication portable station, and particularly relates to integrated and detachable portable satellite communication stations.

Description of Related Art

10 A satellite communication portable station is a portable ultra small-aperture satellite communication station, and supports multimedia communication services, such as voice, data, audio/video, and wide area network access by forming a satellite communication network with links of a geosynchronous orbit satellite and is a desirable means to implement services such as remote data transmission, emergency communication at a scene of an accident, and live video broadcasting. The satellite
15 communication portable station adopts an azimuth, pitch, and polarization tri-axial servo system and can implement one-click full-automatic satellite alignment. Because the satellite communication station has high requirements for the precision of satellite alignment and specific requirements for the speed of satellite alignment, azimuth and pitch transmission mechanisms of the satellite communication station need to adopt
20 precision transmission mechanisms with a large transmission ratio. As a result, an existing satellite communication portable station has a large volume and a heavy weight, is inconvenient to pack, and has poor transportability.

SUMMARY OF THE INVENTION

Technical Problem

25 The technical problem to be solved by the present invention is to provide an integrated satellite communication portable station that has a small volume and a light weight, is convenient to carry, and has higher transmission precision to remedy the

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deficiencies in the prior art.

Technical Solution

To solve the technical problem, a technical solution adopted in the present invention is: an integrated portable satellite communication station, including an azimuth transmission mechanism, a pitch transmission mechanism, and an antenna, where the pitch transmission mechanism is connected above the azimuth transmission mechanism; the azimuth transmission mechanism includes a base, an azimuth shaft, an azimuth stepper motor, and an azimuth turntable, the azimuth shaft being disposed in a vertical direction perpendicular to the base, and the azimuth stepper motor and the azimuth turntable being sequentially arranged on the azimuth shaft from top to bottom; the pitch transmission mechanism includes a pitch pedestal, a pitch stepper motor, a rotating shaft, and an antenna bracket, the pitch pedestal being connected to the azimuth turntable by using a pin, the azimuth stepper motor being located in the pitch pedestal, the pitch stepper motor being disposed on the pitch pedestal, the rotating shaft being disposed in the pitch stepper motor in a horizontal direction, and each of two ends of the rotating shaft being provided with the antenna bracket; and the antenna is located on the antenna bracket.

Furthermore, one pitch harmonic reducer is disposed on the rotating shaft on each of two sides of the pitch stepper motor.

Furthermore, one flange plate for fixing the antenna bracket is disposed on an outer side of each of the pitch harmonic reducers.

Furthermore, one manual rotating plate is disposed on the azimuth shaft.

Furthermore, one azimuth harmonic reducer is disposed on the azimuth shaft.

Further provided is a detachable portable satellite communication station, including an azimuth transmission mechanism, a pitch transmission mechanism, an antenna, and a satellite-finding control cabinet, where,

the azimuth transmission mechanism includes a base, an azimuth shaft, an azimuth stepper motor, and an azimuth turntable, the azimuth shaft being vertically disposed on the base, the azimuth turntable being fixed on the azimuth shaft, and the azimuth stepper motor being disposed above the azimuth turntable and passing through the azimuth turntable to be fixedly connected to the azimuth shaft;

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the pitch transmission mechanism includes a pitch pedestal, a pitch stepper motor, a rotating shaft, and an antenna bracket, the pitch pedestal being connected to an upper portion of the azimuth turntable by using a pin, the azimuth stepper motor being located at a bottom of a slot in the middle of the pitch pedestal, the pitch stepper
5 motor being disposed on an upper portion of the slot in the middle of the pitch pedestal, the rotating shaft sequentially passing through one side of the slot, the pitch stepper motor, and the other side of the slot along a horizontal direction, and two ends of the antenna bracket being respectively mounted on flange plates located on left and right sides of the pitch pedestal; and the antenna is mounted on the antenna bracket.

10 Furthermore, the base is detachably mounted on the satellite-finding control cabinet, and the satellite-finding control cabinet is used to control the azimuth transmission mechanism and the pitch transmission mechanism.

Furthermore, a locking mechanism is further included, where the locking mechanism is fixed on the satellite-finding control cabinet, and the satellite-finding
15 control cabinet is detachably connected to the base by using the locking mechanism.

Furthermore, the locking mechanism includes a left locking ring, a connecting rod, a right locking ring, and a locking handle, the left locking ring and the right locking ring being both semicircles and symmetrically disposed on left and right sides of the locking mechanism, one end of the left locking ring being rotatably connected
20 to one end of the locking handle, one end of the right locking ring being rotatably connected to one end of the connecting rod, and the other end of the connecting rod being rotatably connected to the locking handle; when the locking handle is closely attached on the right locking ring, the left locking ring and the right locking ring are in a tightened state; and when the locking handle is away from the right locking ring, the
25 left locking ring and the right locking ring are in a loose state.

Furthermore, convex claws are further disposed on inner sides of the left locking ring and the right locking ring.

Furthermore, the locking mechanism clamps the base by using the left locking ring and the right locking ring, so as to fix the base.

30 Advantageous Effect

Advantageous effects are: The apparatus provided in the present invention has a

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small volume and a light weight, is convenient to transport and carry, has high transmission precision, and therefore has a faster speed in use and can adjust an angle more rapidly.

BRIEF DESCRIPTION OF THE DRAWINGS

5 **FIG.1** is a schematic structural diagram of an integrated portable satellite communication station of the present invention.

FIG.2 is a perspective view of a pitch transmission mechanism and an azimuth transmission mechanism of an integrated portable satellite communication station.

FIG.3 is a cross-sectional diagram of a pitch transmission mechanism and an
10 azimuth transmission mechanism of an integrated portable satellite communication station.

FIG.4 is a schematic structural diagram of a detachable portable satellite communication station of the present invention.

FIG.5 is a perspective view of a pitch transmission mechanism and an azimuth
15 transmission mechanism of a detachable portable satellite communication station.

FIG.6 is a cross-sectional diagram of a pitch transmission mechanism and an azimuth transmission mechanism of a detachable portable satellite communication station.

FIG.7 is a schematic structural diagram of a locking mechanism.

20 In **FIG.8**, (a) is a schematic diagram when a base is fixed on a satellite-finding control cabinet, (b) is a schematic diagram when a locking mechanism is loose, and (c) is a schematic diagram when a base is away from a satellite-finding control cabinet,

 where, 1-base, 2-azimuth shaft, 3-azimuth stepper motor, 4-azimuth turntable, 5-pitch pedestal, 6-pitch stepper motor, 7-rotating shaft, 8-antenna bracket, 9-pitch
25 harmonic reducer, 10-flange plate, 11-manual rotating plate, 12-azimuth harmonic reducer, 13-locking mechanism, 14-satellite-finding control cabinet, 15-left locking ring, 16-connecting rod, 17-right locking ring, and 18-locking handle.

DETAILED DESCRIPTION OF THE INVENTION

To make the objective and technical solution of the embodiments of the present

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invention more clear, the following clearly and completely describes the technical solution of the embodiments of the present invention with reference to the accompanying drawings of the embodiments of the present invention. Obviously, the described embodiments are only a part rather than all of the embodiments of the present invention. All other embodiments obtained by persons of ordinary skill in the art based on the embodiments of the present invention without inventive efforts shall fall within the protection scope of the present invention.

Persons skilled in the art could understand that all terms used herein (including technical terms and scientific terms), unless otherwise defined herein, have the same meanings that persons of ordinary skills in the art would generally understand. It should also be understood that those terms defined in universal dictionaries shall be understood as having meanings consistent with the meanings in the context of the prior art, and may not, unless otherwise defined herein, be interpreted using ideal or excessively formal meanings.

The meaning of the "and/or" in the present invention refers to that the cases where one party exists individually or both of the parties exist simultaneously are included therein.

The meanings of the "inner, outer" in the present invention refer to that the direction pointing to an interior of a device relative to the device by itself is inner, and otherwise, outer, rather than to constitute specific limitations to the apparatus mechanisms of the present invention.

The meanings of "left, right" in the present invention refer to that when a reader is facing the accompanying drawings, the left side of the reader is left and the right side of the reader is right, rather than to constitute specific limitations to the apparatus mechanisms of the present invention.

The meanings of the "connection" in the present invention may be a direct connection between parts, or may also be an indirect connection between parts by using another part.

As shown in the accompanying drawings, FIG.1 is a schematic structural diagram of an integrated portable satellite communication station of the present invention; FIG.2 is a perspective view of a pitch transmission mechanism and an azimuth transmission mechanism of an integrated portable satellite communication station;

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FIG.3 is a cross-sectional diagram of a pitch transmission mechanism and an azimuth transmission mechanism of an integrated portable satellite communication station; FIG.4 is a schematic structural diagram of a detachable portable satellite communication station of the present invention; FIG.5 is a perspective view of a pitch transmission mechanism and an azimuth transmission mechanism of a detachable portable satellite communication station; FIG.6 is a cross-sectional diagram of a pitch transmission mechanism and an azimuth transmission mechanism of a detachable portable satellite communication station; FIG.7 is a schematic structural diagram of a locking mechanism; in FIG.8, (a) is a schematic diagram when a base is fixed on a satellite-finding control cabinet, (b) is a schematic diagram when a locking mechanism is loose, and (c) is a schematic diagram when a base is away from a satellite-finding control cabinet.

As shown in FIG.1 to FIG.3, an integrated portable satellite communication station of the present invention includes an azimuth transmission mechanism, a pitch transmission mechanism, and an antenna, where the pitch transmission mechanism is connected above the azimuth transmission mechanism. The azimuth transmission mechanism includes a base 1, an azimuth shaft 2, an azimuth stepper motor 3, and an azimuth turntable 4. The azimuth shaft 2 is disposed in a vertical direction perpendicular to the base 1. The azimuth stepper motor 3 and the azimuth turntable 4 are vertically arranged on the azimuth shaft 2 from top to bottom. The pitch transmission mechanism includes a pitch pedestal 5, a pitch stepper motor 6, a rotating shaft 7, and an antenna bracket 8. The pitch pedestal 5 is connected to the azimuth turntable 4 by using a pin. The azimuth stepper motor 3 is located in the pitch pedestal 5. The pitch stepper motor 6 is disposed on the pitch pedestal 5. The rotating shaft 7 is disposed in the pitch stepper motor 6 in a horizontal direction. Each of two ends of the rotating shaft 7 is provided with the antenna bracket 8. The antenna is located on the antenna bracket 8.

The whole pitch transmission mechanism and azimuth transmission mechanism are integrated. The antenna is elevated by using the pitch transmission mechanism. In the pitch transmission mechanism, the pitch stepper motor 6 provides power to drive the rotating shaft 7 to rotate, so as to enable a left antenna bracket 8 to perform pitch swing, so that the antenna implements a function of adjusting an angle. In the azimuth transmission mechanism, the azimuth stepper motor 3 provides power to drive the

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azimuth turntable 4 to rotate; and the azimuth turntable 4 is connected to the pitch pedestal 5 by using the pin; therefore, the azimuth turntable 4 also drives the whole pitch transmission mechanism to perform planar rotation.

One pitch harmonic reducer 9 is disposed on the rotating shaft 7 on each of two sides of the pitch stepper motor 6. The pitch harmonic reducers 9 has a speed reduction effect for the rotation and stop of the pitch stepper motor 6, that is, achieves a speed reduction effect during angle adjustment of the antenna through elevation, and may further reinforce the antenna.

One flange plate 10 for fixing the antenna bracket 8 is disposed on an outer side of each of the pitch harmonic reducers 9. The flange plates 10 fix a location relationship between the pitch harmonic reducers 9 and the antenna bracket 8, to prevent the antenna from slight swings or offsets during elevation.

One manual rotating plate 11 is disposed on the azimuth shaft 2, to prevent the situation in which the azimuth stepper motor 3 is incapable of working normally when a failure occurs, that is, the azimuth transmission mechanism may be driven to rotate by manually rotating the manual rotating plate 11.

One azimuth harmonic reducer 12 is disposed on the azimuth shaft 2 and can have a speed reduction effect for the rotation and stop of the azimuth stepper motor 3, thereby ensuring the safety of the whole machine and the surrounding environment.

As shown in FIG.4, in the view of a detachable portable satellite communication station including an azimuth transmission mechanism, a pitch transmission mechanism, an antenna, and a satellite-finding control cabinet in another implementation manner of the present invention, the azimuth transmission mechanism includes a base 1, an azimuth shaft 2, an azimuth stepper motor 3, and an azimuth turntable 4. The azimuth shaft 2 is vertically disposed on the base 1. The azimuth turntable 4 is fixed on the azimuth shaft 2. The azimuth stepper motor 3 is disposed above the azimuth turntable 4 and passes through the azimuth turntable 4 to be fixedly connected to the azimuth shaft 2.

The pitch transmission mechanism includes a pitch pedestal 5, a pitch stepper motor 6, a rotating shaft 7, and an antenna bracket 8. The pitch pedestal 5 is connected to an upper portion of the azimuth turntable 4 by using a pin. The azimuth stepper motor 3 is located at a bottom of a slot in the middle of the pitch pedestal 5. The pitch

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stepper motor 6 is disposed on an upper portion of the slot in the middle of the pitch pedestal 5. The rotating shaft 7 sequentially passes through one side of the slot, the pitch stepper motor 6, and the other side of the slot along a horizontal direction. Two ends of the antenna bracket 8 are respectively mounted on flange plates 10 located on
5 left and right sides of the pitch pedestal 5. The antenna is mounted on the antenna bracket 8.

The base 1 is detachably mounted on the satellite-finding control cabinet 14. The satellite-finding control cabinet 14 is used to control the azimuth transmission mechanism and the pitch transmission mechanism. A locking mechanism 13 is further
10 included. The locking mechanism 13 is fixed on the satellite-finding control cabinet 14. The satellite-finding control cabinet 14 is detachably connected to the base 1 by using the locking mechanism 13.

As shown in FIG.7, the locking mechanism 13 includes a left locking ring 15, a connecting rod 16, a right locking ring 17, and a locking handle 18. The left locking
15 ring 15 and the right locking ring 17 are both semicircles and symmetrically disposed on left and right sides of the locking mechanism 13. One end of the left locking ring 15 is rotatably connected to one end of the locking handle 18. One end of the right locking ring 17 is rotatably connected to one end of the connecting rod 16. The other end of the connecting rod 16 is rotatably connected to the locking handle 18. When
20 the locking handle 18 is closely attached on the right locking ring 17, the left locking ring 15 and the right locking ring 17 are in a tightened state. When the locking handle 18 is away from the right locking ring 17, the left locking ring 15 and the right locking ring 17 are in a loose state. Convex claws are further disposed on inner sides of the left locking ring 15 and the right locking ring 17. The locking mechanism 13
25 clamps the base 1 by using the left locking ring 15 and the right locking ring 17, so as to fix the base 1.

As shown in FIG.8, in FIG.8(a), the base 1 is fixed on the satellite-finding control cabinet 14, and the connection and fixation between the base 1 and the satellite-finding control cabinet 14 are implemented by using the locking mechanism
30 13. A lower end of the base 1 is nested between the left locking ring 15 and the right locking ring 17 of the locking mechanism 13 and is locked and fixed by the left locking ring 15 and the right locking ring 17. When the portable station needs to be disassembled and recycled, in FIG.8(b), the locking handle 18 of the locking

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mechanism is grasped and the locking handle 18 is pulled outwards, to enable the left locking ring 15 and the right locking ring 17 of the locking mechanism 13 to extend outwards, until the convex claws on the inner sides of the locking rings are completely withdrawn. In this case, the pressing and fixing effects on the azimuth base by using
5 the locking mechanism disappears. Finally, as shown in FIG.8(c), the azimuth and pitch transmission mechanisms are pulled out upwards, so that the portable station is disassembled into two independent parts.

Only the implementation manners of the present invention are provided in the foregoing, and the description thereof is relatively specific and detailed, but this
10 cannot be construed as limitations to the patent scope of the present invention. It should be noted that persons of ordinary skills in the art may further obtain, without departing from the concept of the present invention, several variations and improvements, which all fall within the protection scope of the present invention.

CLAIMS

What is claimed is:

1. An integrated portable satellite communication station, comprising: an azimuth transmission mechanism, a pitch transmission mechanism, and an antenna, wherein
5 the pitch transmission mechanism is connected above the azimuth transmission mechanism; the azimuth transmission mechanism comprises a base (1), an azimuth shaft (2), an azimuth stepper motor (3), and an azimuth turntable (4), the azimuth shaft (2) being disposed in a vertical direction perpendicular to the base (1), and the azimuth stepper motor (3) and the azimuth turntable (4) being sequentially arranged
10 on the azimuth shaft (2) from top to bottom; the pitch transmission mechanism comprises a pitch pedestal (5), a pitch stepper motor (6), a rotating shaft (7), and an antenna bracket (8), the pitch pedestal (5) being connected to the azimuth turntable (4) by using a pin, the azimuth stepper motor (3) being located in the pitch pedestal (5), the pitch stepper motor (6) being disposed on the pitch pedestal (5), the rotating shaft
15 (7) being disposed in the pitch stepper motor (6) in a horizontal direction, and each of two ends of the rotating shaft (7) being provided with the antenna bracket (8); and the antenna is located on the antenna bracket (8).
2. The integrated portable satellite communication station according to claim 1,
20 wherein one pitch harmonic reducer (9) is disposed on the rotating shaft (7) on each of two sides of the pitch stepper motor (6).
3. The integrated portable satellite communication station according to claim 2,
wherein one flange plate (10) for fixing the antenna bracket (8) is disposed on an
25 outer side of each of the pitch harmonic reducers (9).

CLAIMS

4. The integrated portable satellite communication station according to claim 1,
wherein one manual rotating plate (11) is disposed on the azimuth shaft (2).
5. The integrated portable satellite communication station according to claim 1,
5 wherein one azimuth harmonic reducer (12) is disposed on the azimuth shaft (2).
6. A detachable portable satellite communication station, comprising: an azimuth
transmission mechanism, a pitch transmission mechanism, an antenna, and a
satellite-finding control cabinet (14), wherein,
- 10 the azimuth transmission mechanism comprises a base (1), an azimuth shaft (2), an
azimuth stepper motor (3), and an azimuth turntable (4), the azimuth shaft (2) being
vertically disposed on the base (1), the azimuth turntable (4) being fixed on the
azimuth shaft (2), and the azimuth stepper motor (3) being disposed above the
azimuth turntable (4) and passing through the azimuth turntable (4) to be fixedly
15 connected to the azimuth shaft (2);
- the pitch transmission mechanism comprises a pitch pedestal (5), a pitch stepper
motor (6), a rotating shaft (7), and an antenna bracket (8), the pitch pedestal (5) being
connected to an upper portion of the azimuth turntable (4) by using a pin, the azimuth
stepper motor (3) being located at a bottom of a slot in the middle of the pitch pedestal
20 (5), the pitch stepper motor (6) being disposed on an upper portion of the slot in the
middle of the pitch pedestal (5), the rotating shaft (7) sequentially passing through one
side of the slot, the pitch stepper motor (6), and the other side of the slot along a
horizontal direction, and two ends of the antenna bracket (8) being respectively
mounted on flange plates (10) located on left and right sides of the pitch pedestal (5);
25 the antenna is mounted on the antenna bracket (8); and
- the base (1) is detachably mounted on the satellite-finding control cabinet (14), and
the satellite-finding control cabinet (14) is used to control the azimuth transmission
mechanism and the pitch transmission mechanism.

CLAIMS

7. The detachable portable satellite communication station according to claim 6, further comprising: a locking mechanism (13), wherein the locking mechanism (13) is fixed on the satellite-finding control cabinet (14), and the satellite-finding control cabinet (14) is detachably connected to the base (1) by using the locking mechanism (13).

8. The detachable portable satellite communication station according to claim 7, wherein the locking mechanism (13) comprises a left locking ring (15), a connecting rod (16), a right locking ring (17), and a locking handle (18), the left locking ring (15) and the right locking ring (17) being both semicircles and symmetrically disposed on left and right sides of the locking mechanism (13), one end of the left locking ring (15) being rotatably connected to one end of the locking handle (18), one end of the right locking ring (17) being rotatably connected to one end of the connecting rod (16), and the other end of the connecting rod (16) being rotatably mounted on the locking handle (18); when the locking handle (18) is closely attached on the right locking ring (17), the left locking ring (15) and the right locking ring (17) are in a tightened state; and when the locking handle (18) is away from the right locking ring (17), the left locking ring (15) and the right locking ring (17) are in a loose state.

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9. The detachable portable satellite communication station according to claim 8, wherein convex claws are further disposed on inner sides of the left locking ring (15) and the right locking ring (17).

25 10. The detachable portable satellite communication station according to claim 8 or 9, wherein the locking mechanism (13) clamps the base (1) by using the left locking ring (15) and the right locking ring (17), so as to fix the base (1).