(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
25 April 2002 (25.04.2002)

PCT

(10) International Publication Number
WO 02/33436 A2

(51) International Patent Classification[7]: G01S

(21) International Application Number: PCT/US01/32498

(22) International Filing Date: 17 October 2001 (17.10.2001)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
60/241,255 17 October 2000 (17.10.2000) US

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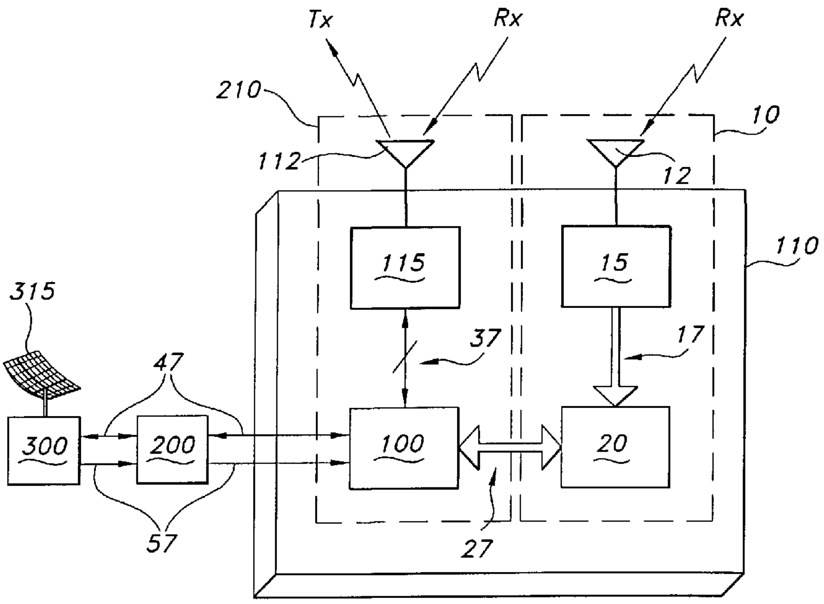
(81) Designated States *(national)*: AE, AG, AL, AM, AT, AT (utility model), AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, CZ (utility model), DE, DE (utility model), DK, DK (utility model), DM, DZ, EC, EE, EE (utility model), ES, FI, FI (utility model), GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SK (utility model), SL, TJ, TM, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZW.

(84) Designated States *(regional)*: ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

**Published:**
— *without international search report and to be republished upon receipt of that report*

*[Continued on next page]*

(54) Title: INTEGRATED DATALINKS IN A SURVEILLANCE RECEIVER




(57) Abstract: A surveillance transceiver system is provided for receiving extended squitters from Mode S transponders, translating the squitters into ADS-B state vectors in UAT format, and transmitting the ADS-B state vectors using a Universal Access Transceiver (UAT) datalink. The surveillance transceiver system bridges the gap created by differently-equipped aircraft by using multiple datalinks to provide seamless ADS-B surveillance. The module for processing the extender squitters includes a 1090 MHz receiver and a computer processor in communication with the UAT processor for parsing the squitter and composing the ADS-B state vector in UAT format for broadcast.

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# INTEGRATED DATALINKS IN A SURVEILLANCE RECEIVER

## Technical Field

The present invention relates generally to the field of avionics and surveillance transceiver systems. More particularly, the invention relates to a method, apparatus, system, and computer software product for receiving and translating ADS-B messages from Mode S format to UAT format for broadcast using a Universal Access Transceiver.

## Background of the Invention

Historically, the air traffic control system has relied upon a network of ground-based radar stations and a transponder onboard each aircraft. In response to a radar beacon interrogation from a ground station, the transponder broadcasts a response. The transponder signal provides the air traffic controller with very basic information about the aircraft. The transponder transmits a four-digit octal code and the ownship altitude. The aircraft position is inferred by measuring the time of reception and the angular position of the radar dish.

The Mode Select Beacon (Mode S) system was developed to add a unique identifier called an ICAO aircraft address to the radar beacon interrogation and to the transponder's responsive signal. ICAO is the International Civil Aviation Organization, a body that promulgates standards for civil aviation. Because a Mode S interrogation is addressed to a specific aircraft, only the Mode S transponder onboard that particular aircraft will respond. The Mode S system is sometimes called the Mode S datalink.

The Automatic Dependent Surveillance – Broadcast (ADS-B) system was developed to take advantage of the satellite-based Global Positioning System (GPS) to directly transmit aircraft latitude and longitude without using ground-based radar interrogations. The GPS-based position data is updated continuously, is highly accurate, and does not require the typical transponder interrogation. An aircraft equipped with ADS-B automatically and periodically broadcasts a digital signal to all other ADS-B-equipped aircraft. The ADS-B signal contains extensive information about the aircraft's position and heading as well as the integrity of such information.

The Federal Aviation Administration initiated the Capstone Program, a project designed to improve civil aviation safety and efficiency through the use of GPS-based avionics and datalink communications. Under the Capstone Program, certain commercial and government aircraft in the Alaska testing region were equipped with ADS-B systems. A network of ground-based transceivers capable of receiving and transmitting ADS-B signals were also installed in the testing region.

Ground-based and mobile transceivers with internal signal processors are used to receive and transmit ADS-B signals. A transceiver is capable of both receiving and transmitting signals. The Universal Access Transceiver (UAT) is a radio datalink system that supports ADS-B and other broadcast services. The UAT datalink provides communication between ADS-B-equipped aircraft and ground stations.

In addition to receiving and transmitting ADS-B signals from aircraft, the UAT datalink system is capable of uplinking and broadcasting data from fixed ground radar stations in two modes: FIS-B (Flight Information Services – Broadcast) mode and TIS-B (Traffic Information Services – Broadcast) mode. FIS-B data includes a wide variety of information, including weather broadcasts (graphical and text), airport status reports, temporary airspace restrictions, and official Notices to Airmen called NOTAMs. TIS-B data includes information about air traffic gathered from ground-based radar systems.

The RTCA, an organization that promulgates consensus-based aviation standards, is developing a standard format for messages transmitted via a UAT datalink system. This UAT format requires the data to be in a certain order. An ADS-B signal can be broadcast on a UAT datalink system if the signal is placed in the standard UAT format.

An ADS-B signal can also be broadcast on a Mode S datalink. The ADS-B signal from a Mode S datalink is called a Mode S extended squitter. The UAT datalink, however, is not equipped to receive or transmit Mode S extended squitters.

While many small planes and commuter jets are equipped with radar transponders, they are not equipped to broadcast Mode S extended squitters. Similarly, while most commercial airliners are equipped with Mode S transponders, most are not equipped to broadcast signals in UAT format. Accordingly, a mixture of equipment onboard different aircraft will remain a challenge for air traffic control and monitoring systems.

Thus, there is a need for a transceiver system that is capable of receiving a Mode S extended squitter and transmitting the data contained within the squitter in UAT format to ADS-B-equipped aircraft, vehicles, and stations. There is a related need for computer software to translate a Mode S extended squitter into a transmittable UAT-format ADS-B signal.

There is also a need for a device that will facilitate interoperability between and among the various types of avionics communication equipment in use today.

There is a further need for a single surveillance device capable of receiving Mode S extended squitters from aircraft and traffic data from fixed ground radar stations, and further capable of transmitting the data in an ADS-B-compatible format using a Universal Access Transceiver radio datalink system.

**Summary of the Invention**

The above and other needs are met by the present invention which, in one embodiment, generally provides an apparatus, a method, and a system for receiving extended squitters from Mode S transponders, translating the squitters into ADS-B state vectors, and transmitting the ADS-B state vectors using a transceiver system. The transceiver system integrates transponder datalink technology and ADS-B datalink technology in a single surveillance receiver.

In one aspect of the present invention, the apparatus for processing a squitter includes a receiver capable of receiving the squitter in a first format from a vehicle, a processor configured to translate the squitter into a new transmittable ADS-B signal in a second format, and a transmitter. In one embodiment, the squitter is an extended squitter made up of several segments broadcast by a Mode S transponder. In one embodiment, the transmittable ADS-B signal is an ADS-B state vector in UAT format composed according to existing standards.

In one embodiment, the processor may include several processors connected to one another and connected to the receiver and the transmitter. The processor or processors may also be configured to control the receipt and transmission of traffic data from fixed ground radar stations.

In one embodiment, the transmitter is a transceiver, capable of receiving and transmitting signals in a second format. Where such a transceiver is present, the processor is configured to suspend translation of a squitter received from a target when a signal having the second format is also received from the same target. In one embodiment, the transmitter is a Universal Access Transceiver (UAT) and the processor suspends translation of incoming signals that are in UAT format.

In another aspect of the invention, the apparatus for translating a squitter into an ADS-B signal in UAT format includes a squitter receiver and a processor. The processor is configured to parse the squitter into its component data and then use the data to compose an ADS-B state vector. In one embodiment, the parsed data may be stored in a track file.

In another aspect, a method for processing a squitter generally includes the steps of receiving the squitter from a vehicle via a receiver, translating the squitter into a transmittable ADS-B signal using a processor, and transmitting the ADS-B signal in UAT format via a transmitter. The step of translating, in one

embodiment, includes parsing the squitter into its component data and composing the new ADS-B signal using the data. In one embodiment, the step of parsing the squitter includes storing the data in track file.

In an embodiment where the transmitter is a transceiver capable of receiving and transmitting UAT signals, the method of the present invention also includes the step of suspending the translation of a squitter received from a target when an UAT signal is also received from the same target.

In another aspect, the method of translating a squitter within a transceiver system includes the steps of receiving the squitter, parsing the squitter into its component data, composing a new ADS-B signal from the data, and transmitting the ADS-B signal. The parsing and composing steps may be accomplished in one or more processors, alone or in cooperation with one another.

In another aspect of the invention, a system for processing a squitter includes a vehicle equipped with an onboard transmitter, a receiver configured to receive the squitter from the onboard transmitter, a computer processing device, and a transmitter. The computer device includes a first processing portion to parse the squitter into its component data and a second portion to compose a new ADS-B signal using the data.

In one embodiment, the system includes several computer devices that may work in tandem to execute the first and second processing portions. In one embodiment, the computer device includes a third processing portion to compose the new ADS-B signal in UAT format. In an embodiment where the transmitter is a transceiver, the computer device also includes a fourth processing portion to suspend translation of a squitter received from a target when a UAT signal is also received from said target.

In another embodiment of the system, the computer device also includes a traffic processing portion to receive traffic data from fixed ground radar stations and a broadcast processing portion to direct the transmitter to transmit said traffic data.

In another aspect, the invention includes computer software for translating a squitter into an ADS-B signal in UAT format. The software is designed to operate within a system having a transceiver component. The software includes a first executable portion to parse the squitter into its component data and a second portion to compose the ADS-B signal from the data.

In one embodiment, the first executable portion includes a sub-portion to store the data in a track file. In one embodiment where the transmitter is a transceiver, the software also includes a third executable portion to suspend translation of a squitter received from a target when a UAT signal is also received from said target.

In yet another aspect of the present invention, a squitter translator is integrated into an existing transceiver system. The squitter translator includes a squitter receiver and a squitter processor. The squitter processor is linked to the transceiver system such that the squitter in a first format is translated into an ADS-B signal in a second format suitable for broadcast by the transceiver system.

In another aspect, the present invention includes a translator module for use with an existing transceiver system. The module includes a receiver and a squitter processor. The squitter processor is designed to be connected for data communication to the transceiver system. The squitter processor translates the squitter in a first format into a new ADS-B signal in a second format that is compatible with the transceiver. In one embodiment, the squitter processor parses the squitter into its component data and then composes the ADS-B signal using the data.

Thus, it is an object of the present invention to provide an apparatus for translating Mode S extended squitters into ADS-B signals in UAT format. It is a related object of the present invention to provide a system for receiving squitters from transponders, for translating the squitters into ADS-B state vectors, and for transmitting the ADS-B state vectors in UAT format using a UAT datalink system.

It is a further object of the present invention to provide an apparatus and a transceiver system that is capable of receiving a Mode S extended squitter and transmitting the data contained within the squitter to ADS-B-equipped aircraft in a compatible format. It is a related object of the present invention to provide processors and computer software to translate the Mode S squitter into a transmittable ADS-B signal in UAT format.

It is also an object of the present invention to provide a single surveillance device capable of receiving Mode S squitters, ADS-B signals, and traffic data from fixed ground radar stations, and further capable of transmitting the data in an ADS-B-compatible format using a universal access transceiver radio datalink system. It is a related object of the present invention to facilitate interoperability between and among the various types of avionics communication equipment.

These and other objects accomplished by the present invention will become apparent from the following detailed description of one preferred embodiment in conjunction with the accompanying drawings.

## Brief Description of the Drawings

**Fig. 1** is a diagrammatic view of a transceiver system according to an embodiment of the present invention.

**Fig. 2** is a diagrammatic view of differently-equipped aircraft in relation to a transceiver system, in accordance with an embodiment of the present invention.

**Fig. 3** is a flow chart illustrating the translation of a series of incoming Mode S extended squitters into an ADS-B state vector for transmission over a UAT datalink system, in accordance with an embodiment of the present invention.

**Detailed Description of the Drawings**

Referring now in more detail to the drawings, in which like numerals indicate like elements throughout the several views, **Fig. 1** illustrates a ground-based transceiver system **110** which consists of a Universal Access Transceiver (UAT) system **210** and a module **10**, according to an embodiment of the present invention. The UAT system **210** provides a radio datalink for ADS-B signals, FIS-B signals, and TIS-B signals. With the module **10** installed, the transceiver system **110** of the present invention is additionally capable of providing a radio datalink for transmitting the data contained within Mode S extended squitter signals to vehicles equipped with a UAT datalink system. Although position signals are generally described in this application as being received from and transmitted to aircraft, it should be understood that the present invention can be used to process signals from any type of vehicle or station and to broadcast signals to any type of properly-equipped vehicle or station.

Although **Fig. 1** shows a ground-based transceiver system **110**, it should be understood that the present invention can also utilize airborne transceiver systems.

<u>The Universal Access Transceiver System **210**</u>

The UAT system **210** is capable of receiving and transmitting ADS-B signals from aircraft. It should be understood that the present invention may be practiced using transceivers having transceiver formats different from the UAT format.

The UAT system **210** generally includes a transceiver **115** connected by a serial connection **37** to a first processor **100**. The serial connection **37** enables the transceiver **115** to be in communication with the first processor **100**. The transceiver **115** includes an antenna **112** that is configured to receive and transmit signals. The arrows labeled **Rx** indicates a signal being received. The arrow labeled **Tx** represents a signal being transmitted.

The UAT system **210** is also capable of uplinking and broadcasting data from fixed ground radar stations in two well-known modes: FIS-B (Flight Information Services – Broadcast) mode and TIS-B (Traffic Information Services – Broadcast) mode. The first processor **100** of the UAT system **210** is in communication with one or more air traffic control centers **300** via a link that may or may not include one or more intermediate computer servers **200**. Information received from FAA weather processing systems, Flight Service Stations, and weather specialists in Air Traffic Control is collectively referred to as FIS-B. The phrase, "traffic data from fixed ground radar stations" as it is used in this application includes both FIS-B and TIS-B.

The first processor **100** receives TIS-B signals from the air traffic control center **300** via a TIS-B link **47**. Signals broadcast in TIS-B mode include information about air traffic from ground-based radar **315**. TIS-B generally includes all the data used by air traffic controllers.

Additionally, the first processor **100** receives FIS-B signals from the air traffic control center **300** via an FIS-B link **57**. Signals broadcast in FIS-B mode include a wide variety of information, including weather broadcasts (graphical and text), airport status reports, temporary airspace restrictions, uncharted obstacles, and official Notices to Airmen (NOTAMs).

<u>The Module **10**</u>

In one aspect of the invention, the module **10** includes a receiver **15** connected by a one-way direct memory access connection **17** to a second processor **20**. The connection **17** enables the receiver **15** to be in communication with the second processor **20**. The receiver **15** includes a receive-only 1090 MHz antenna **12** that is configured to receive extended squitters from transponders. The second processor **20** of the module **10** of the present invention is connected by a direct memory access connection **27** to a first processor **100**. The connection **27** enables the first processor **100** to be in communication with the second processor **20**.

In one embodiment, as shown in **Fig. 1**, the module **10** of the present invention is configured to be installed within a UAT system **210**. The module **10** in this embodiment may also be referred to as a squitter translator or a translator module. Together, the module **10** and the UAT system **210** form a transceiver system **110** capable of providing a radio datalink for ADS-B signals, FIS-B signals, and TIS-B signals.

Components suitable for use in practicing the present invention are available from UPS Aviation Technologies, Inc., of Salem, Oregon, including the AT7000 Mode S datalink transponder, the Apollo GBT2000 ADS-B datalink ground station, the Universal Access Transceiver (UAT), the AT2000 multi-function cockpit display of traffic information (CDTI), and the AT9000 link and display processing unit (LDPU). Moreover, technology suitable for use in practicing the present invention has been developed as part of the FAA Capstone Program, including onboard ADS-B systems, onboard cockpit displays, and ground-based transceiver systems.

Differently-Equipped Aircraft

In another aspect of the present invention, the transceiver system **110** enables communication between and among aircraft having different equipment. The UAT system **210** shown in **Fig. 1**, by itself, is not equipped to receive or transmit Mode S extended squitters broadcast by aircraft equipped with transponders.

It should be noted that UAT datalink systems **30** and Mode S transponders **40** (see **Fig. 2**) broadcast signals in different formats, containing different information. For example, a Mode S extended squitter **50** may be broadcast at a frequency of 1090 MHz, whereas a UAT-format ADS-B signal **35** may be broadcast at 978 MHz. A Mode S extended squitter **50** may contain ADS-B messages transmitted in multiple segments, whereas a UAT-format ADS-B signal **35** may be transmitted in a single unsegmented message.

As shown in **Fig. 2**, the transceiver system **110** of the present invention is capable of processing a UAT-format ADS-B signal **35** from a UAT-equipped aircraft **60**. The antenna **112** of the transceiver **115** (shown in **Fig. 1**) is configured to receive UAT-format ADS-B signals **35**.

Many small planes flown by private pilots can be economically equipped with a UAT datalink system **30**. Many commuter jets and newer small planes, on the other hand, may adopt both a UAT datalink system **30** and a Mode S squitter transponder **40**. These dual-equipped aircraft **65** broadcast a UAT-format ADS-B signal **35** and a Mode S extended squitter **50**. The transceiver system **110** of the present invention is capable of processing both types of signals. The 1090 MHz antenna **12** of the receiver **15** (shown in **Fig. 1**) is configured to receive extended squitters **50**.

The transceiver system **110** of the present invention is also capable of processing an extended squitter **50** from a transponder-equipped aircraft **70**, such as a commercial passenger jet. The 1090 MHz antenna **12** of the receiver **15** (shown in **Fig. 1**) is configured to receive extended squitters **50**. Many commercial jets are equipped with a Mode S transponder **40** that has been upgraded for extended squitter capability.

As shown in **Fig. 1**, the transceiver **115** includes an antenna **112** that is capable of both receiving and transmitting signals. A signal being received is labeled **Rx**. A signal being transmitted is labeled **Tx**.

Translation of the ADS-B Signal from Mode S Format to UAT Format

In another aspect, shown in **Fig. 3**, the transceiver system **110** of the present invention translates an extended squitter **50** in a first format (such as Mode S format) into an ADS-B state vector **56** in a second format (such as UAT format) for broadcast to ADS-B-equipped aircraft. The present invention receives an incoming signal in a first format and translates it into an outgoing signal in a second format that is compatible with the transmitter. The outgoing signal may be translated into UAT format when using the present invention with a Universal Access Transceiver. Alternatively, the outgoing signal may be translated into another second format that is compatible with another known transceiver system.

An ADS-B signal that is transmittable and ready for broadcast by a UAT datalink system generally includes an ADS-B state vector in UAT format **56**. The phrase "in UAT format" indicates an ADS-B signal that has been formatted to conform to the standard format for messages transmitted via a UAT datalink system, such as those standards promulgated by the RTCA organization.

In one aspect of the method of the present invention, the extended squitter **50** is received **81** by the receiver **15**, parsed **82** into a track file **55**, and composed **83** into an ADS-B state vector in UAT format **56**, which is transmitted **84** by the transceiver **115**. The phrase "processing a squitter" generally includes all the steps of handling an incoming squitter, from receipt through transmission.

Generally, at least four segments of a Mode S extended squitter **50** are required to acquire the data needed to compose an ADS-B state vector **56**. The first two segments needed contain position data, transmitted using an even squitter **51** and an odd squitter **52**. The third squitter segment contains airborne velocity **53** (sub-type 1). The fourth segment contains a flight identifier **54** and includes the type of aircraft broadcasting the signal.

These four Mode S extended squitter segments **51, 52, 53, 54** are required in order to assemble a complete ADS-B state vector **56**. In an environment with a high degree of interference, receipt of all four segments **51, 52, 53, 54** may take several seconds. In one aspect of the method of the present invention, the extended squitter **50** will be rejected unless both position squitters **51, 52** are received within a time limit. In other words, the extended squitter **50** will be accepted for translation by the transceiver system **110** only if the even squitter **51** and the odd squitter **52** are received within a time limit. In one embodiment, this time limit may be ten seconds, which is the limit set forth in the standards for Mode S services promulgated by the International Civil Aviation Organization (ICAO).

The receive **81**, parse **82**, compose **83**, and transmit **84** steps shown in **Fig. 3** can be performed in one embodiment by the transceiver system **110** shown in **Fig. 1**. In one aspect of the method of the present invention, the receiver **15** (through its antenna **12**) receives **81** the extended squitter **50**. The bits of data contained within the squitter **50** may be shared with the second processor **20** through a one-way direct memory access (DMA) connection **17**. One skilled in the art will appreciate and understand the shared-memory architecture provided by DMA connections.

The second processor **20** is configured to parse **82** the extended squitter **50** into its component data. Each squitter segments contains bits of data. The term "parse" as used in this application means to divide the squitter **50** into its component parts and to maintain those parts in an accessible format. The accessible format may be a track file **55** containing the data. Thus, the term "parse" may include the storing of each of the extracted bits in a track file **55**. The track file **55** contains the data gathered about a particular target or aircraft being tracked. The track file **55** may be temporary. Several track files **55** may exist simultaneously.

The second processor **20** (sometimes referred to as the squitter processor) may be connected to the first processor **100** by a direct memory access (DMA) connection **27**. The DMA connection **27** provides an open link between the two processors **20, 100** for sharing data and information. The processors **20, 100** are configured to compose **83** an ADS-B state vector in UAT format **56** using the bits stored in the track file **55**. In one embodiment, the second processor **20** may parse **82** the squitter **50** and may house the stored track file **55**, whereas the first processor composes the state vector **56**.

In an alternative embodiment, the second processor **20** parses the squitter **50** and composes the state vector **56**, which may be shared with the first processor **100** through the DMA connection **27**. The creation of the ADS-B state vector **56** may take place within either or both processors **20, 100**.

To compose **83** an ADS-B state vector in UAT format **56**, the method of the present invention follows the protocols and standards governing the order and formatting of data in a UAT signal, such as those promulgated by RTCA and/or the International Civil Aviation Organization (ICAO). The composing step **83** involves packing the bits of data from the track file **55** into the proper order, and in the standard UAT format, to create an ADS-B state vector **56** that is recognizable and compatible with UAT datalink systems **30**.

Transmission of the ADS-B state vector in UAT format **56** is facilitated by a serial connection **37** to the transceiver **115** in the UAT system **210**. The serial connection **37** acts as a high-speed link between the first processor **100** and the transceiver **115**. One skilled in the art will understand and appreciate the usefulness of a serial connection **37** in this context. The transmit **84** step of the method is accomplished by the transceiver **115**, through its antenna **112**.

<u>Redundant Signals</u>

As shown in **Fig. 2**, dual-equipped aircraft **65** broadcast both a UAT-format signal **35** and a Mode S extended squitter **50**. It should be understood that UAT-format ADS-B signals **35** and extended squitters **50** both contain aircraft identifiers **54** so that, as soon as the signals are received, the transceiver system **110** will understand that both signals originate from the same dual-equipped aircraft **65**.

In another aspect of the method of the present invention, the processors **100**, **20** are configured to suspend the translation of a squitter **50** received from an aircraft when a UAT-format ADS-B signal **35** has been received from the same aircraft. The term "suspend" should be understood to mean that the process of translating that particular squitter is halted or stopped temporarily, as long as the squitter's aircraft identifier **54** matches the ADS-B signal's aircraft identifier **54**. Composing an ADS-B state vector **56** from the squitter **50** would create a redundant signal that might compete within the channel bandwidth. In this aspect, the invention eliminates the broadcast of redundant signals and minimizes confusion and clutter.

It will be appreciated by one skilled in the art that a transceiver system **110** as described herein may be realized in many different manners consistent with the spirit and scope of the present invention. Therefore, it will be further appreciated that the transceiver system **110** as described herein supports a corresponding apparatus and methodology. In addition, the transceiver system **110** may be implemented in software, hardware, or a combination of software and hardware, as will be appreciated by one skilled in the art, who will further appreciate that the system **110** supports a corresponding system based upon a computer device and associated computer software.

Many modifications and alternative embodiments of the present invention will come to mind when one skilled in the art receives the benefit of the teachings presented in the foregoing descriptions and the associated drawings. Therefore, it is to be understood that the invention is not to be limited to the specific embodiments disclosed and that modifications and other embodiments are intended to be included within the scope of the appended claims. Although specific terms are used and details are shown herein, they are used in a generic and descriptive sense only, and not for purposes of limitation.

## CLAIMS

What is claimed is:

1. An apparatus for processing a squitter received from a vehicle, comprising:

a receiver configured to receive a squitter from a vehicle;

a processor in communication with said receiver and configured to translate said squitter into a transmittable ADS-B signal; and

a transmitter in communication with said processor and configured to transmit said ADS-B signal.

2. An apparatus according to claim 1, wherein said squitter is an extended squitter from a Mode S transponder.

3. An apparatus according to claim 1, wherein said transmittable ADS-B signal comprises an ADS-B state vector in UAT format.

4. An apparatus according to claim 1, wherein said processor comprises one or more processors in communication with said receiver and said transmitter.

5. An apparatus according to claim 1, wherein said processor is further configured to receive traffic data from fixed ground radar stations and said transmitter is further configured to transmit said traffic data.

6. An apparatus according to claim 1, wherein said transmitter is a Universal Access Transceiver configured to receive and transmit ADS-B signals in UAT format.

7. An apparatus according to claim 6, wherein said processor is further configured to suspend translation of a squitter received from a target when a UAT signal is also received from said target.

8. An apparatus for translating a Mode S extended squitter into an ADS-B state vector, said apparatus in communication with a transceiver system, the transceiver system characterized by a transceiver and a first processor, said apparatus comprising:

a receiver configured to receive an extended squitter from a vehicle; and

a second processor in communication with said receiver and with said first processor, said second processor configured to parse said squitter into its component data and compose an ADS-B state vector using said data.

9. An apparatus according to claim 8, wherein said first processor is configured to cooperate with said second processor to parse said squitter into its component data.

10. An apparatus according to claim 8, wherein said first processor is configured to cooperate with said second processor to compose said ADS-B state vector using said data.

11. An apparatus according to claim 8, wherein said extended squitter comprises a plurality of segments.

12. An apparatus according to claim 8, wherein said second processor stores said component data in a track file.

13. An apparatus according to claim 8, wherein said second processor composes said ADS-B state vector in UAT format.

14. A method for processing a squitter received from a vehicle, comprising:

receiving a squitter from a vehicle via a receiver;

translating said squitter into a transmittable ADS-B signal using a processor in communication with said receiver; and

transmitting said ADS-B signal via a transmitter in communication with said processor.

15. A method according to claim 14, wherein said step of translating said squitter further comprises:

parsing said squitter into its component data; and

composing a transmittable ADS-B signal from said data.

16. A method according to claim 15, wherein said step of parsing said squitter further comprises storing said data in a track file.

17. A method according to claim 15, wherein said step of composing a transmittable ADS-B signal further comprises composing said ADS-B signal in UAT format.

18. A method according to claim 17, further comprising:

suspending the translation of a squitter received from a target when a UAT signal is also received from said target.

19. A method for translating a Mode S extended squitter into an ADS-B state vector within a transceiver system, the transceiver system characterized by a receiver, a processor, and a transmitter, said method comprising:

receiving a squitter from a vehicle via said receiver;

parsing said squitter into its component data using said processor;

composing an ADS-B state vector from said data using said processor; and

transmitting said ADS-B state vector via a transmitter in communication with said processor.

20. A method according to claim 19, wherein said step of parsing said squitter further comprises storing said data in a track file.

21. A method according to claim 19, wherein said step of composing an ADS-B state vector further comprises composing said ADS-B state vector in UAT format.

22. A method according to claim 19, wherein said processor comprises one or more processors.

23. A method according to claim 22, wherein said processors are configured to cooperate to parse said squitter into its component data.

24. A method according to claim 22, wherein said processors are configured to cooperate to compose said ADS-B state vector using said data.

25. A method according to claim 19, wherein said transmitter is a Universal Access Transceiver configured to receive and transmit ADS-B signals in UAT format.

26. A method according to claim 25, further comprising:

suspending the translation of a squitter received from a target when a UAT signal is also received from said target.

27. A system for processing a squitter received from a vehicle, comprising:

a vehicle equipped with an onboard transmitter;

a receiver configured to receive a squitter from said onboard transmitter;

a computer processing device in communication with said receiver, said computer device comprising:

a first processing portion configured to parse said squitter into its component data; and

a second processing portion configured to compose a transmittable ADS-B signal using said data; and

a transmitter in communication with said processor and configured to transmit said ADS-B signal.

28. A system according to claim 27, wherein said computer processing device comprises one or more computer processing devices in communication with said receiver and said transmitter.

29. A system according to claim 28, wherein said computer processing devices are configured to cooperate to execute said first and second processing portions.

30. A system according to claim 27, wherein said transmitter is a Universal Access Transceiver configured to receive and transmit ADS-B signals in UAT format.

31. A system according to claim 30, wherein said computer processing device further comprises:

a third processing portion configured to suspend translation of a squitter received from a target when a UAT signal is also received from said target.

32. A system according to claim 27, wherein said computer processing device further comprises:

a traffic processing portion configured to receive traffic data from fixed ground radar stations; and

a broadcast processing portion configured to direct said transmitter to transmit said traffic data.

33. A computer software program product translating a Mode S extended squitter into an ADS-B state vector in a system having a transceiver component, the transceiver component characterized by a receiver, a processor, and a transmitter, said product comprising:

a first executable portion configured to parse said squitter into its component data; and

a second executable portion configured to compose an ADS-B state vector from said data.

34. A computer software program product according to claim 33, wherein said first executable portion further comprises a sub-portion configured to store said data in a track file.

35. A computer software program product according to claim 33, further comprising:

a third executable portion configured to compose said ADS-B state vector in UAT format.

36. A computer software program product according to claim 33, further comprising:

a fourth executable portion configured to suspend translation of a squitter received from a target when a UAT signal is also received from said target.

37. A method of integrating a squitter translator into a transceiver system, comprising:

adding a receiver configured to receive a squitter in a first format from a vehicle;

adding a squitter processor in communication with said receiver; and

linking said squitter processor to said transceiver system such that said squitter is parsed into its component data and an ADS-B signal in a second format is composed using said data, said second format compatible with said transceiver system.

38. A translator module for use with a transceiver system, comprising:

a receiver configured to receive a squitter in a first format from a vehicle; and

a squitter processor in communication with said receiver and including a link configured to be connected for data communication with said transceiver system, said squitter processor being configured to translate said squitter into an ADS-B signal in a second format, said second format compatible with said transceiver system.

39. A module according to claim 38, wherein said squitter processor is further configured to parse said squitter into its component data and to compose said ADS-B signal using said data.

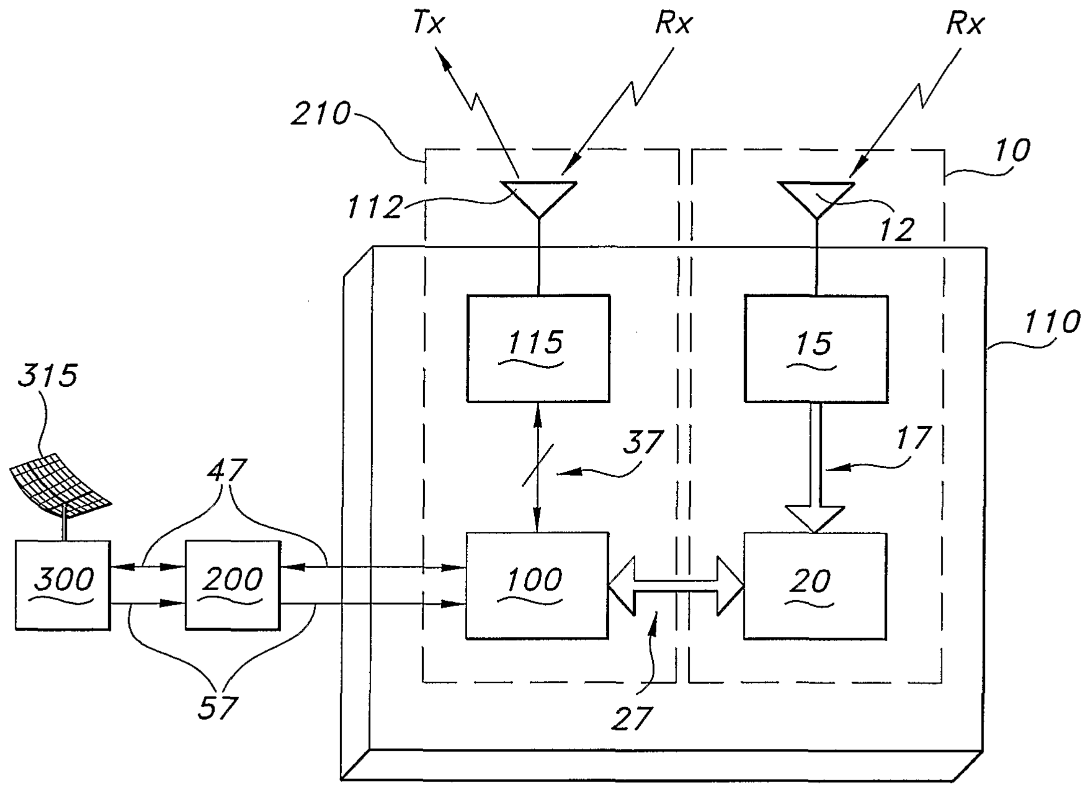


FIG 1

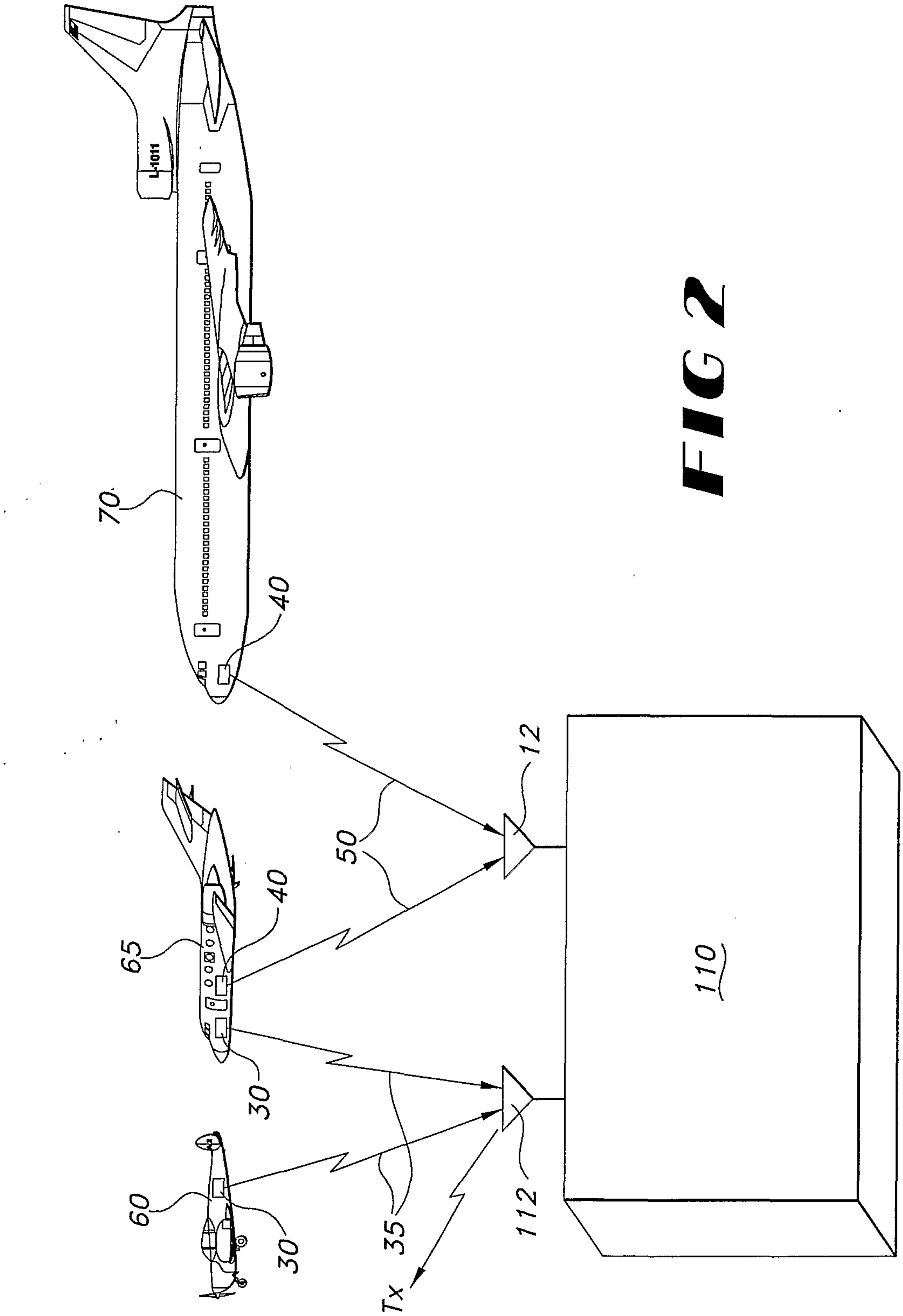


FIG 2

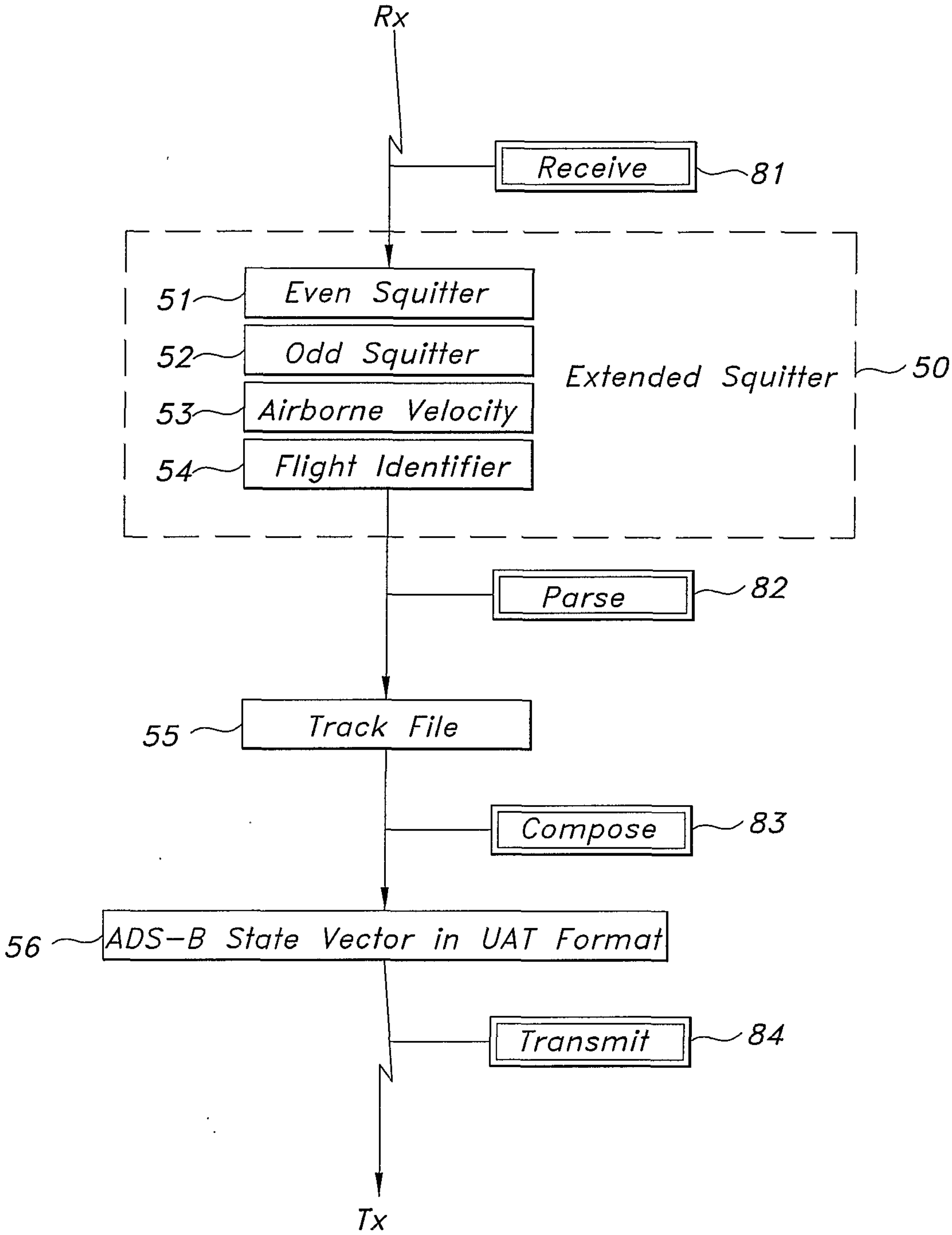
Rx
Receive
81
51
Even Squitter
52
Odd Squitter
53
Airborne Velocity
54
Flight Identifier
Extended Squitter
50
Parse
82
55
Track File
Compose
83
56
ADS-B State Vector in UAT Format
Transmit
84
Tx

FIG 3