Honeywell

Business, Regional, &
General Aviation
23500 W. 105th Street
Olathe, KS 66061

Service Aid

SERVICE AID: SM/TR 4000-102
Skymap /Tracker IIIC

SUBJECT: Memory Battery Replacement

The Skymap IIIC and Tracker IIIC units have an internal Lithium battery that must be replaced every 4 to 7 years. The unit will display the message *Low Battery* when the battery needs to be replaced. Another indication that the battery needs to be replaced is that the unit will not retain user waypoints or flightplans after the power on the unit has been cycled. The unit will also lose the GPS Almanac, which results in slow times for the GPS receiver to lock on and go Navigational ready.

When the internal memory battery needs replaced, use P/N 015-00220-0003, which is equivalent to the original battery and a direct replacement.

The Skymap IIIC and Tracker IIIC are considered portable equipment in the U.S.A, and are not certified with a TSO or PMA. Consequently, the battery may be replaced by a qualified avionics shop according to the instructions in this service aid, without referring to a maintenance manual or completing a return-to-service test. This bulletin is only intended to provide guidance for replacing the Internal Memory Battery; it may not be referred to for any other type of repair to the Skymap IIIC and Tracker IIIC.

WARNING

THIS UNIT CONTAINS A LITHIUM THIONYL AA BATTERY. IF THIS BATTERY IS DAMAGED OR DETERIORATES TO THE POINT THAT THE CASE SEAL IS BROKEN, THEN AN IRRITANT GAS AND CORROSIVE CHEMICALS CAN BE RELEASED, AND SPONTANEOUS IGNITION COULD OCCUR. THE BATTERY MUST BE CHECKED PERIODICALLY TO ENSURE IT IS SERVICEABLE AND UNDAMAGED. THE DISPOSAL OF UNSERVICABLE LITHIUM BATTERIES MIGHT BE SUBJECT TO LOCAL REGULATIONS.

CAUTION

Never remove the PCMCIA card while the unit is switched on. Never switch the unit on when there is no PCMCIA card installed unless told to do so during a test.

CAUTION

These units contain components that are sensitive to electrostatic discharge. Any disassembly/assembly of the unit MUST be done at a static-safe workstation. When handling the internal components of the unit, take the proper precautions, such as wearing an anti-static wristband and properly grounding the unit.

TOOL LIST

The following tools are needed to disassemble the Skymap IIIC and Tracker IIIC units:

A. Hexagonal Key/Allen Wrench, size 1/16-inch AF.

B. Hexagonal Key/Allen Wrench, size 2mm AF.

C. Temperature Controlled Soldering/De-soldering Iron.

D. Box End Wrench, Spanner, or Nut Driver, size 5.0mm.

E. Box End Wrench, Spanner, or Nut Driver, size 5.5mm.

PROCEDURE

When disassembling the unit, keep *all parts* for unit re-assembly. Be particularly careful with the small screws, washers, nuts, and spacers.

Refer to the assembly drawing in Figure 1 as necessary.

NOTE

When re-installing washers into the unit, the beveled face of the washer must be in contact with the printed circuit board in order to provide a balanced fit when the unit is re-assembled.

1. Remove the Rear Cover Assembly
   A. Place the Skymap IIIC unit on a clean, flat surface with the rear cover on top.
   B. Loosen the two M4 captive case screws that secure the rear cover to the top cover and chassis assembly.
   C. Lift the rear cover off of the unit.
2. Separate the Top Cover from the Chassis and PCB Assembly
   A. Remove the PCMCIA card from the PCMCIA interface by gently easing it from its socket.
   B. Carefully remove the sealing gasket from around the edge of the Chassis and PCB Assembly.
   C. Using a hexagonal key, remove the four innermost M3 socket-head screws that secure the Chassis and PCB Assembly to the top cover assembly.

D. Separate the Chassis and PCB Assembly from the top cover assembly by carefully lifting it in a straight line out of the top cover assembly. Do not disconnect the two flat ribbon cables connecting the Chassis and PCB Assembly and the top cover assembly.

E. Position the two assemblies facing each other so that the ribbon cables are not pulled tight and the circuit boards are facing up.

3. Remove the Graphics PCB Sub-Assembly

A. Using a box spanner, remove the four M3 nuts and the washers securing the graphics PCB sub-assembly to the Chassis and PCB Assembly.

B. Carefully ease the Graphics PCB assembly away from the Microprocessor PCB to disengage the connectors P1, P4 and P5.

C. Remove the four washers on the standoffs from the Microprocessor PCB.

4. Remove the Microprocessor PCB Assembly

A. Remove the Graphics PCB sub-assembly from the Microprocessor PCB.

B. Using a hexagonal key and a small spanner, remove the four socket-head screws.

C. Secure the stand-offs at each corner of the Chassis Sub-Assembly. Keep the screws, stand-offs, washers, and grounding tags.

D. Using an M3 box spanner, remove the two nuts, spring washers, and washers that secure the locking screws to the Microprocessor PCB.

E. Carefully remove the Microprocessor PCB Assembly out of the chassis molding. This will disengage connectors P4 and P5 from the PCMCIA Interface Board.

F. On a Skymap IIIC only - Using a box spanner, remove the gold-plated nut and washer that secure the GPS engine RF cable to the chassis molding.

5. Replace the Battery

A. Clip the battery leads next to the battery. Save the tubing that was on the positive lead of the old battery.

B. Unsolder the leads of the battery, and clear the solder from the holes on the microprocessor PBC board.

C. Take the tubing that was saved in step B. Install it on the positive lead of the new battery, and solder the new battery flush to the Microprocessor PBC.

D. When the new battery is installed, confirm that the battery is operating within specifications and there is no other problem. This can be done by measuring the backup voltage and current.

(1) Measure the voltage across the battery. The voltage must be 3.8V to 3.5V for a new battery.

(2) Measure the voltage across R55 (adjacent to the positive battery lead). The voltage across R55 in mV is roughly equivalent to the current across R55 in µA. (For example, 46mV across R55 equals approximately 46µA). The voltage across R55 must be between 40mV and 80mV.

(3) If these two measurements do not fall within their respective ranges, return the unit to the factory for repair.

6. Case Resistance Checks

A. Prior to re-installing the Processor Board, check the case resistances.

(1) Measure from the top of a mounting post to the post diagonally opposite. Measure again from the other diagonally opposite corners of the case.

(2) There are also specific points on each case that need to be measured. Copper-colored spray must measure less than 2Ω from any point to any point. Gray-colored sprayed cases must measure less than 6Ω from any point to any point.

(3) If the case does not meet these specifications, we recommend that a new case be installed. However, the cases are currently available only from the factory in the United Kingdom. The phone number for the factory is 44-1243-783-763.

7. Reassemble the Microprocessor PCB

A. On a Skymap IIIC only - Feed the gold-plated SMB plug (removed in Step 4F) and GPS engine RF cable through the hole in the chassis molding. Using a box spanner, secure the plug with the gold-plated washer and nut removed in Step 4.F. Ensure that the antenna cable is routed correctly so that it is not damaged when the PCB is reassembled.

B. Reinstall the Microprocessor PCB Assembly into the chassis molding, ensuring that the long pins of plugs P4 and P5 mate correctly with sockets on the PCMCIA Interface PCB.

C. Secure the Microprocessor PCB Assembly to the chassis molding using the four M3 socket head screws, washers and stand-offs. A grounding tag with copper contacts should be fitted to the upper right rear side and lower left rear side by the M3 screws. Apply Locktite thread lock to the threads of the screws before assembly.

8. Reassemble the Graphics PCB Sub-Assembly

A. Place one washer over the threaded studs on each the four corner stand-offs on the Chassis/Microprocessor PCB Sub-Assembly.

B. Fit the Graphics PCB Assembly and the Microprocessor Assembly together, ensuring that the pins of plugs P1, P4, and P5 on the Microprocessor PCB engage correctly with the corresponding sockets on the Graphics PCB.

C. Apply Locktite thread lock to the threads of the four corner standoffs.

D. Secure the Graphics PCB Assembly to the Chassis/Microprocessor Sub-Assembly with the four M3 washers and nuts using a box spanner.

9. Reassemble the Top Cover and Chassis and PCB Assemblies

A. When fitting the two assemblies together, be extremely careful to ensure that the between-board connectors are correctly aligned and mated. Also, it is essential that the flat cables are correctly inserted into their connectors, treated with silicone sealant, and properly positioned.

B. Line up the Front Cover Assembly with the Chassis and PCB Assembly. Ensure that the four M3 stand-offs pass through the holes in the Graphics Card and that the knob of the on/off and brightness control switch passes through the hole in the front panel.

C. Carefully and evenly push the Chassis and PCB Assembly into the Front Cover Assembly. Secure the Chassis and PCB Assembly to the top cover assembly using the four M3 socket head screws removed in Step 2.C and Locktite thread lock adhesive.

D. Position the sealing gasket around the edge of the Chassis and PCB Assembly.

E. Insert the PCMCIA card into its socket.

F. At this point, you must check the case resistances again. Measure from case to case to ensure that each case is properly grounded. (You should read the same values as listed in the case resistance check in Step 6.)

G. Reinstall the rear cover.

10. Turn the Unit On and Check Operation

After a battery replacement, the Skymap IIIC and Tracker IIIC will need the Date and Time reset. Also, the Skymap IIIC will have to download a new GPS Almanac.

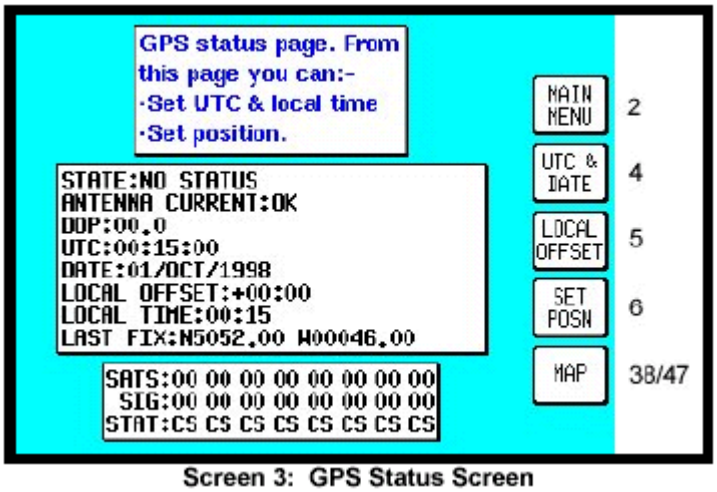
A. Turn the unit on and set the date and time according to the procedures in the following pages.

B. For a Skymap IIIC:

(1) Connect the external GPS Antenna to the Skymap IIIC, and make sure the antenna has a clear, unobstructed view of the sky.

(2) Let the unit download the almanac information. If the GPS receiver already has an almanac, the time needed to acquire satellites is usually less than 2 minutes. However, if the GPS needs to download a new GPS almanac, it could take 10 to 15 minutes for the unit to acquire the almanac information and acquire enough satellites to go NAV-ready.

GPS STATUS SCREENS
(Skymap IIIC only)



Screen 3: GPS Status Screen

To access this screen, press Key 1, GPS STATUS, in the Main Menu.

The GPS Status Screen will display the receiver's STATUS. The status can be any of the following:

NO STATUS – This means that communication between the GPS Receiver and CPU has failed.

BAD ALMANAC – This means the GPS receiver's information concerning satellite positions is out-of-date. If this occurs, the unit should be left alone with the antenna connected and in view of the sky for approximately 15 minutes. During this time it will automatically lock onto a satellite and load an up-to-date almanac.

<3 SATS – This means that according to the current information available, there are less than three satellites in view and a fix can therefore not be calculated. This message is very rarely displayed.

DIFFERENTIAL – This word will be displayed in conjunction with 2D FIX or 3D FIX. It means that the Skymap IIIC has a fix and is also receiving differential correction signals from an external source.

ACQUIRING – This means the unit is currently searching for satellites or is loading information from one or more satellites.

2D FIX – This means the unit is calculating its position in two dimensions only, latitude and longitude, with no height information.

3D FIX – This means that the unit is calculating its position in three dimensions and can give latitude, longitude, and height information.

POOR DOP – This means that the unit is unable to calculate position because of the poor geometry of the visible satellites. (DOP stands for Dilution of Precision.)

POS PROP – This means that navigation has been temporarily lost and the Skymap IIIC is dead-reckoning (or propagating) its position based on the last known position, track, and ground speed. It will not dead-reckon for more than a few seconds at a time.

Other information that is displayed on this Screen includes:

DOP (Dilution of Precision) – This is a number between 00.0 and 99.0 that represents the dilution of quality of the calculated fix due to satellite geometry. The best reading is 00.0 is, 99.9 is the worst. If this figure is greater than 5.0, performance of the system is likely to be degraded because some of the visible satellites appear too close to each other. DOP is calculated from the angular separation between the various visible satellites, and greater separation results in better fix calculations and a lower DOP. (The DOP number does not indicate any specific unit of measurement.)

UTC/DATE – Universal or Greenwich Mean Time and Date.

LOCAL OFFSET – the difference between UTC and local time.

LOCAL TIME – calculated by adding Local Offset to UTC.

LAST FIX – If the unit does not have a current valid fix, this is the position at which it last had a fix. If the unit has a fix, this is the present position.

There are three rows of information about the satellites, **SATS** – the identification number of each satellite, **SIGS** – signal strength for each satellite, and **STAT** – status of each satellite.

Each satellite has a PRN (Pseudo Random Noise) or identification number. The satellite PRN numbers are displayed in a line beside the word SATS.

The two-digit number under each PRN number is an indication of the signal strength being received from that satellite expressed in terms of a percentage. The best possible percentage is 99, the worst is 00. These numbers can be used for finding and eliminating electrical interference. Readings of 60 and above indicate a good installation.

Under each signal-strength number is a two-character code. These indicate the status of each satellite. These codes are: CS, CA, AS, FA, BD, MD, TA, EA, and AP. These relate to the eight possible receiver modes, and are detailed below.

CS (Code Search) – This is the receiver's initial stage in acquiring a satellite. It means that the receiver is trying to match its internal code to the satellite signal.

CA (Code Acquire) – This means the satellite code has been received and matched to the receiver-generated code.

AS (AGC Set) – This means the satellite strength has been assessed and the Automatic Gain Control has been set.

FA (Frequency Acquire) – This means the receiver has correctly locked onto the satellite's data frequency.

BD (Bit Sync Detect) – This means the receiver is synchronized with the satellite's data bit stream.

MD (Message Detect) – This means the receiver is synchronized with the satellite's message stream.

TA (Time Available) – This means the satellite is fully locked in and has sent down UTC time and date information to the receiver.

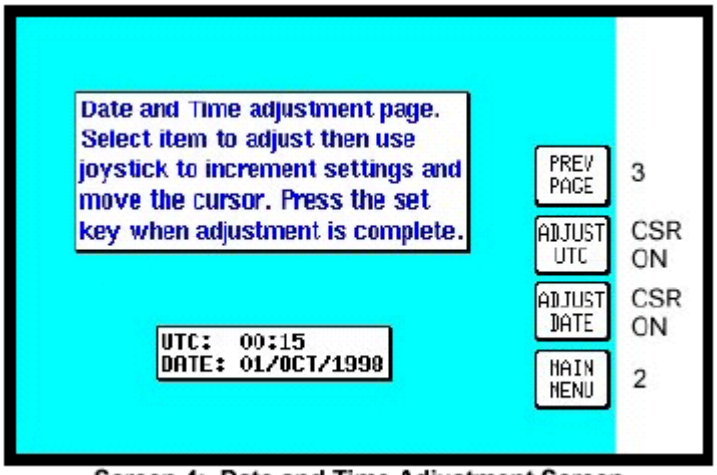
EA (Ephemeris Acquire) – This means the receiver is reading the constellation health status message from the satellite. This usually takes around two minutes, and is a function that is performed in the background even if the receiver has a fix.

AP (Available for Position) – This means the satellite is fully locked-in and tested and can be used for calculating position. A minimum of three satellites are necessary for a 2D fix.

Key 1 returns to Main Menu. Date, Time, Local Time Offset, and Present Position can be adjusted by selecting one of Keys 2, 3, or 4. Direct access to the MAP Mode is available by pressing Key 5.

When using the Skymap IIIC for the first time or after it has been transported more than 100 miles since it was last used, the Skymap will need to recalculate its location. Although the receiver is quite capable of working out its own position, you can considerably speed up the TTFF (time to first fix) by setting up the present position to within 50 miles or so and ensuring that UTC and Date are correct to within a few minutes.

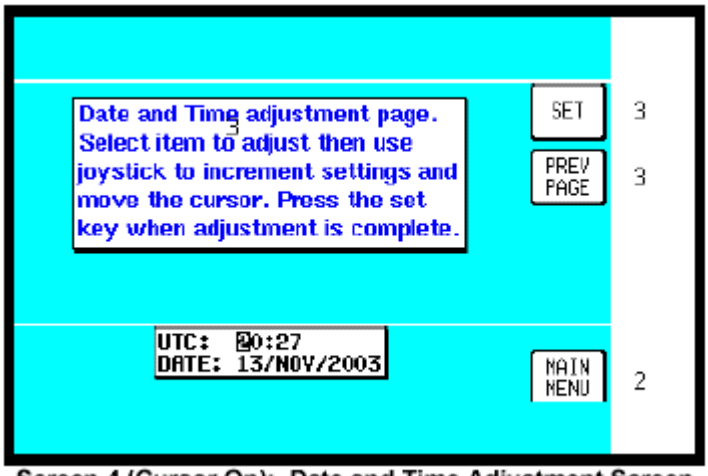
Adjusting Time and Date



Screen 4: Date and Time Adjustment Screen

Press GPS STATUS in Main Menu followed by UTC and DATE to access this screen. Pressing Key 3, ADJUST UTC, places a cursor over the first digit of the HOURS value on the time display. The value can then be increased or decreased by moving the joystick up or down. Pushing the joystick to the right then moves the cursor to the next digit. Similarly, moving the joystick to the left moves the cursor back along the data entry field. When the time is adjusted, the information will only be saved if you press Key 1 SET as illustrated below.

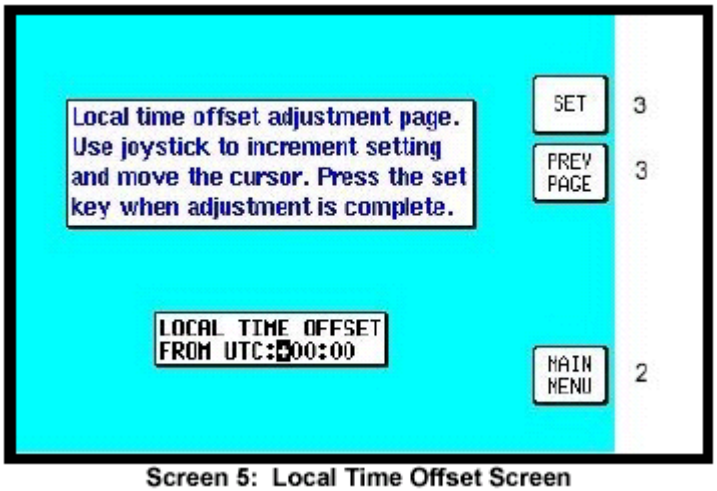
Pressing Key 4 puts a cursor onto the Date entry field. The date is adjusted in the same way as time.



Screen 4 (Cursor On): Date and Time Adjustment Screen

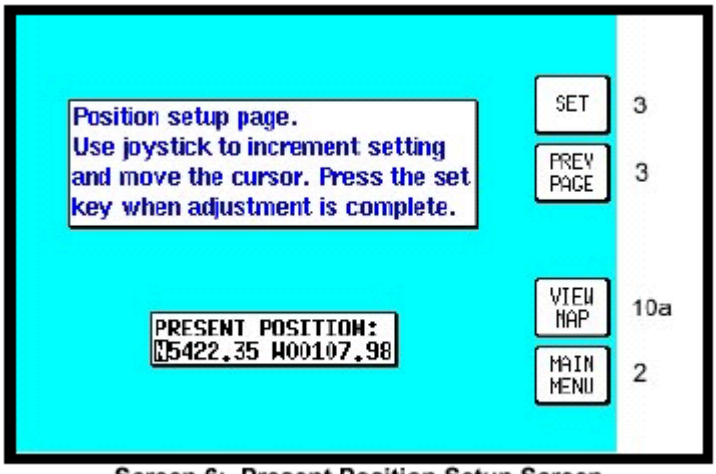
When the cursor is over the Month and the joystick is moved up or down, the first three characters of each month are scrolled together (for example, JAN, FEB, MAR, APR etc.) Adjusting the year works in the same way. Your Bendix/King unit is fully Year-2000 compliant. The Time and Date will be corrected automatically as soon as the first satellite reaches TA (time available) status. If any satellite is already at status TA or above, user inputs of time and date will be ignored.

Setting Local Time Offset



Screen 5: Local Time Offset Screen

Press GPS STATUS in the Main Menu followed by LOCAL OFFSET to access this Screen. When this screen initially appears, a cursor will be active in the data entry field. The hour value can be adjusted between the limits of +12 and -12 by using the joystick. The cursor can then be moved to the right to adjust the minutes to one of two values, 00 or 30. Only upon pressing Key 1, SET, is the information saved; the display will then revert to Screen 3, the GPS Status Screen. The local offset is held in RAM and added to UTC time when calculating ETAs. The default value is +00:00. **It is important to set the local offset correctly to ensure any ETAs given are correct.**



Screen 6: Present Position Setup Screen

Setting Present Position

Press GPS STATUS in the Main Menu followed by SET POSN to access this screen. Upon entry to this screen, a cursor is positioned over the first character of the latitude as shown above. The joystick can then be used to increment or decrement values and to move the cursor right and left. Alternatively, you can press Key 4 VIEW MAP and, simply point at your present position by using the joystick.

Screen 10A: View Map Screen

When Screen 10A is displayed, you can zoom in or out using Keys 3 or 4. By using the joystick you can “bump” the borders of the map window to view anywhere in the world. The position box at the bottom of the screen displays the latitude and longitude of the pointer. Once you have the joystick pointing at your present location, press Key 5 SET POSN to set your position and return to Screen 3, the GPS Status Screen. The pointer latitude and longitude will have become the LAST FIXED POSITION on Screen 3. When new values for latitude and longitude have been selected numerically, pressing Key 1 SET will enter the new latitude and longitude and revert to Screen 3. If the unit is receiving sufficient satellite signals to calculate a fix, user-entered latitude and longitude will be ignored. Keys 3 and 4 give direct access to Time and Date adjustment.

PARTS LIST

1	FRONT COVER (SPRAYED)
2	SEAL
3	SWITCH/SCREENING PCB
4	WASHER, M3, 4 off
5	SPACER, (20mm), 4 off
6	DISPLAY SUB-ASSEMBLY
7	RIBBON CABLE, 18 WAY
8	RIBBON CABLE, 14 WAY
9	JOYSTICK SPRING
10	JOYSTICK (ASSEMBLY)
11	KEYPAD (RUBBER)
12	NUT, M3, 4 off
13	WASHER, M3, 4 off
14	GRAPHICS PCB
15	SPACER, (6mm), 4 off
16	MICROPROCESSOR PCB GPS MFD
17	NUT, 4 - 40 UNC, 2 off
18	WASHER, SPLIT, 4 - 40 UNC, 2 off
19	WASHER, 4 - 40 UNC, 2 off
20	SCREW, No. 4 x 1/4", PN, POZI., 2 off
21	PCMCIA INTERFACE PCB
22	GPS ENGINE RF CABLE
23	CHASSIS
24	SCREW, SOCKET HEAD, M3 x 10, 8 off
25	TAG, EARTHING, 2 off
26	'E' CIRCLIP, 2 off
27	WASHER, FLAT, M4, 2 off
28	WASHER, WAVY, M5, 2 off
29	SCREW, CASE, 2 off
30	REAR COVER
31	SCREWLOCK, 4 - 40 UNC, 2 off
32	PCMCIA CARD (BLANK)
33	SCREW, SELF-TAPPING, 4 off
34	GPS ENGINE
35	SPACER, 5mm, 4 off
36	LITHIUM BATTERY
37	FAN
38	ON/OFF SWITCH & BRIGHTNESS CONTROL (ASSEMBLY)
39	SCREEN

Note: Parts 22, 33, 34 & 35 not used on Tracker.

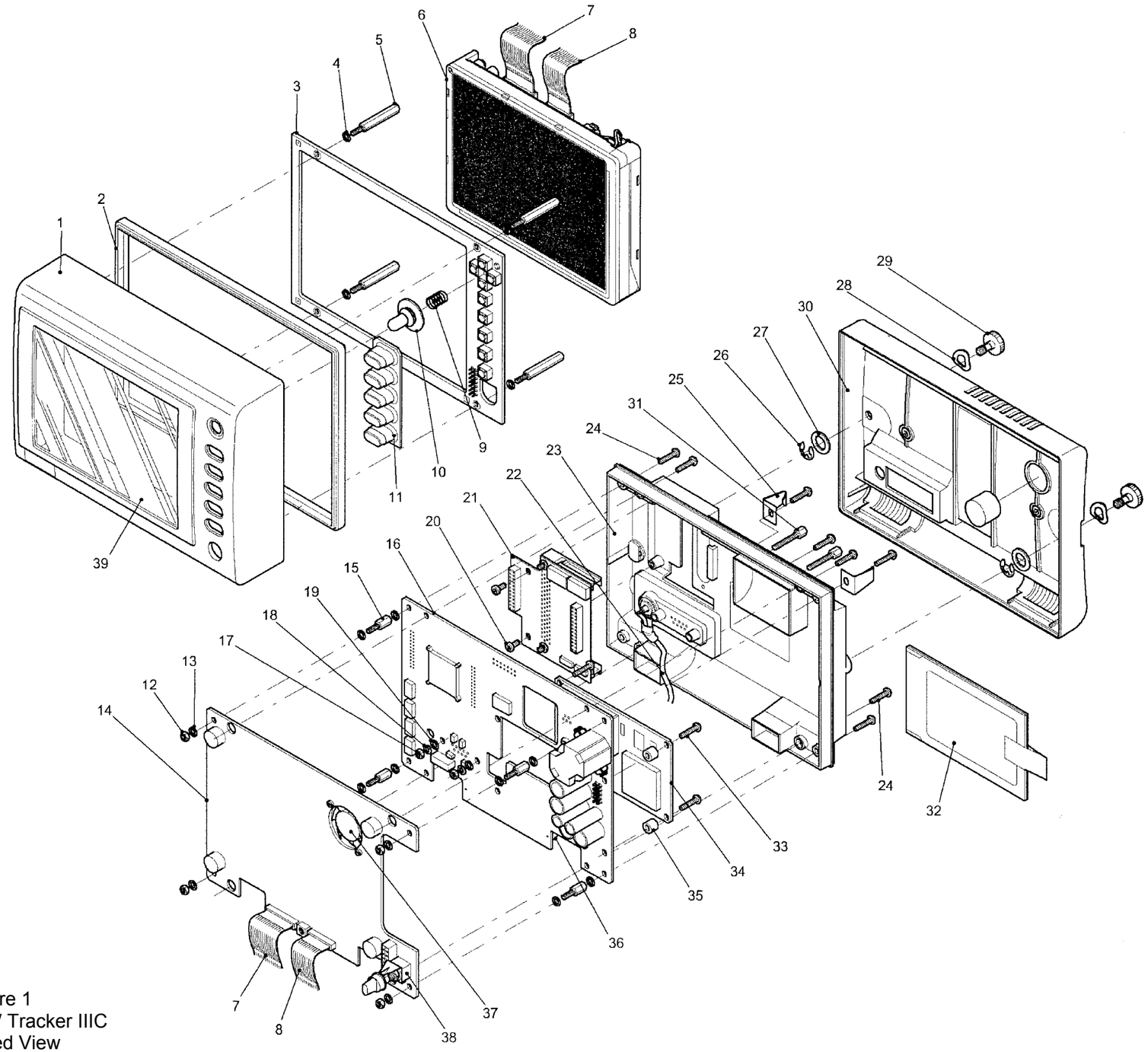


Figure 1
Skymap IIIC / Tracker IIIC
Exploded View