Service Information Letter

SIL reference : SIL-133A/DT/16

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Equipment and p/n : Electronic clock APE4190-0XX

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P/N	CMM reference	Revision
APE4190-030	31-21-26	Issue 6 JUN/13
APE4190-031	31-21-32	Issue 2 JUN/13
APE4190-032	31-21-27	Issue 5 MAR/15
APE4190-035	31-21-34	Issue 5 JAN/14
APE4190-070	31-21-37	Issue 2 MAY/13

Object : *INCORRECT DISPLAY OF LOCAL TIME HOURS AND MINUTES*

1 - PURPOSE

The purpose of this SIL is to inform Bombardier Aerospace and in order to support Bombardier communication to the operators about incorrect Local Time indications on the Cockpit Electrical Clock P/N APE4190-0XX family that occurred since the 1st February 2016, and to highlight recommendations on the subject.

2 - APPLICABILITY in service and production line

This Service Information Letter is applicable to the entire electronic clock APE4190-030/031/032/035/070, and all Amendment of each part number.

3 - TECHNICAL DESCRIPTION

Electrical Clocks provide the crew with 4 functions:
- UTC time based either on internal time ('INT' mode) or on the GPS time ('GPS' synchronization mode)
- Chronometer (counting minutes and seconds).
- Elapsed time (counting hours and minutes).
- Local Time counting based on the UTC seconds second increment.

This anomaly starts in 2016 and during all along, when the Clock APE4190-0XX is synchronized on GPS data (GPS NAV mode), and in case the Clock is in Local Time mode (Flag LT displayed), some erratic display appeared on the minutes and hours.
Even in case of new manually setting by the flight crew of the Local time data, by pressing two seconds on the "Mode" Button, the Local time display will become once again erratic when the second reach 59.

The display anomaly on Local Time hours and minutes could be:
- Incomplete display of digit (missing segment(s));
- Over-range values (59<minutes<99).
- Inconsistent 'minute' field scrolling

Cobham/Air Precision investigation highlighted a software anomaly identical on all the clock P/N APE4190-0XX. This anomaly affects the coding of the Local time data only during the month of February for specific years.
Cobham confirms this anomaly is linked with the GPS synchronization and impacts the clock LT display only when the clock is set in 'GPS' mode.
During the months of February the soft follows a special computing branch to confirm that the day received from GPS or calculated is in the range of the year (leap or not). This module used a subroutine to convert the Year from the BCD to binary data, which places the half carry in the CCR of the microcontroller. This half carry position to 1 depends on the value of years, and isn't reset at the end of the subroutine. The first year for which one this event occurs since 2000 is the current year 2016.
When the GPS is invalid or not present the Module used when the clock is in internal mode, resets during the increment of seconds the half carry of CCR and therefore the Local time coding and display module executed after UTC module is correct. In case the GPS is valid the UTC module branch resetting the half carry isn't executed. That causes during the Local time module execution a trouble because of the use of this half carry to determine to result of increment (hours, minutes).

The clock is fully operative whatever the date in internal mode. This mode (flag INT displayed) is available when there is no hardware connection to the GPS NAV mode, or if GPS data are invalid.
The LT mode is only used for clock display purposes and LT data are not used by any others functions or not provided to equipment connected to the clock.
All clock modes (i.e : DT, GPS, INIT, CHR and ET), excepted LT mode and all other aircraft systems are not affected by this snag.
All along the next years, the LT mode is correctly operate excepted to all along February months 2016 to 2019, 2032 to 2035, 2048 to 2055, over affected years will not have to be considered even for the latest serial production.

4 - FOLLOW UP

Cobham are working on defining a definitive software correction and with Bombardier to establish the action plan schedule.
At this stage, no schedule is available yet and there is no immediate corrective action to fix the concerns on electronics clock in the field.
Operators could be informed of any development of the subject through Bombardier support.

5 - RECOMMENDATION

The cockpit effect associated to this Local Time issue, as described above, is the incorrect display of time on the clocks. There are no other cockpit and system effects.
Considering the above elements, as workaround solution, we recommend:

- APE4190-030; APE4190-031; APE4190-070
  - Operating your fleet using the clock displaying the UTC, GPS or INT mode displayed depending on GPS data validity, during February 2016 and next years impacted, and to not consider temporary the Local time as a valid data.

- APE4190-032
  - Operating your fleet using the clock displaying the UTC in INT mode by disable the GPS function (push more than two seconds on the Mode push button) during February 2016 and next years impacted, and to not consider temporary the Local time as a valid data.

- APE4190-035 – No action required if the GPS synchronization isn't connected to the clock (Current Installation on DASH8-Q400).

- APE4190-070
  - Operating your fleet using the clock displaying the UTC, GPS or INT mode displayed depending on GPS data validity, during February 2016 and next years impacted, and to not consider temporary the Local time as a valid data.

- From a maintenance point of view, it is not needed to replace the clock unit, as the issue is not related to the unit itself and will be extinguished by March 1st

6 - VALIDITY

This SIL remains valid until it is superseded or cancelled by a subsequent revision

7 - SIL Revisions

Date	Author	Modification
2016-02-17	J.RUMELLO	Original