

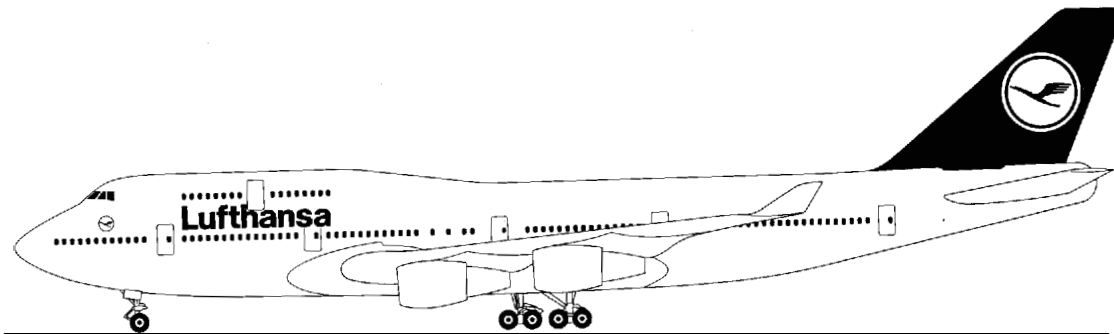


Lufthansa Technical Training

Training Manual B 747-400

ATA 31-25 Clocks

ATA Spec 104 Level 3



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31-25 CLOCKS

INTRODUCTION

The primary function of the clock is to give time reference to other airplane systems and to display universal time coordinated (UTC).

Universal time coordinated was previously known as Greenwich Mean Time (GMT).

The secondary function of the clock is to give a display of elapsed time or chronograph time.

Universal time coordinated and elapsed time are displayed by a liquid crystal numeric type display.

Chronograph minutes are displayed by the liquid crystal display and the seconds displayed by a continuous sweep second hand.

The clock sends UTC and date to other airplane systems on an ARINC 429 bus.

A clock switch on the P72 panel is connected in parallel with the chronograph switch on the clock. This switch is used for remote control of the chronograph start, stop and reset function.

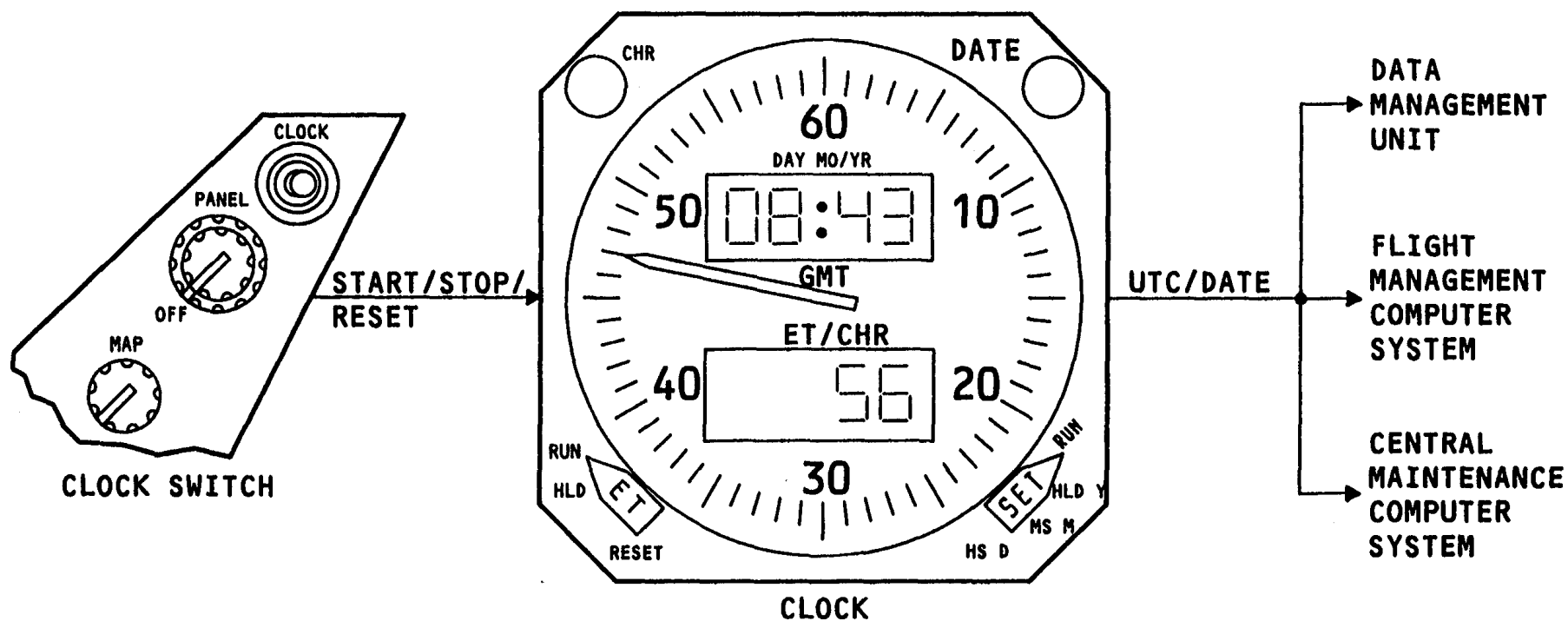


Figure 1 Introduction

INDICATING/ RECORDING SYSTEMS CLOCKS



COMPONENT LOCATIONS

The clock system components are:

- Captain's clock
- First officer's clock
- Captain's clock switch
- First officer's clock switch
- Clock display circuit breaker
- Electronic clock circuit breaker

CLOCK SWITCH

The clock's chronograph (CHR) function is controlled by a remote pushbutton clock switch on the P72 panel, or a pushbutton switch located on the front clock bezel labelled CHR. The internal clock circuitry is capable of accepting a signal from either switch with equal priority. The first switch actuation starts the chronograph. The second actuation holds the chronograph time accumulator, the numeric displays, and the sweep second hand. The third switch actuation resets the chronograph.

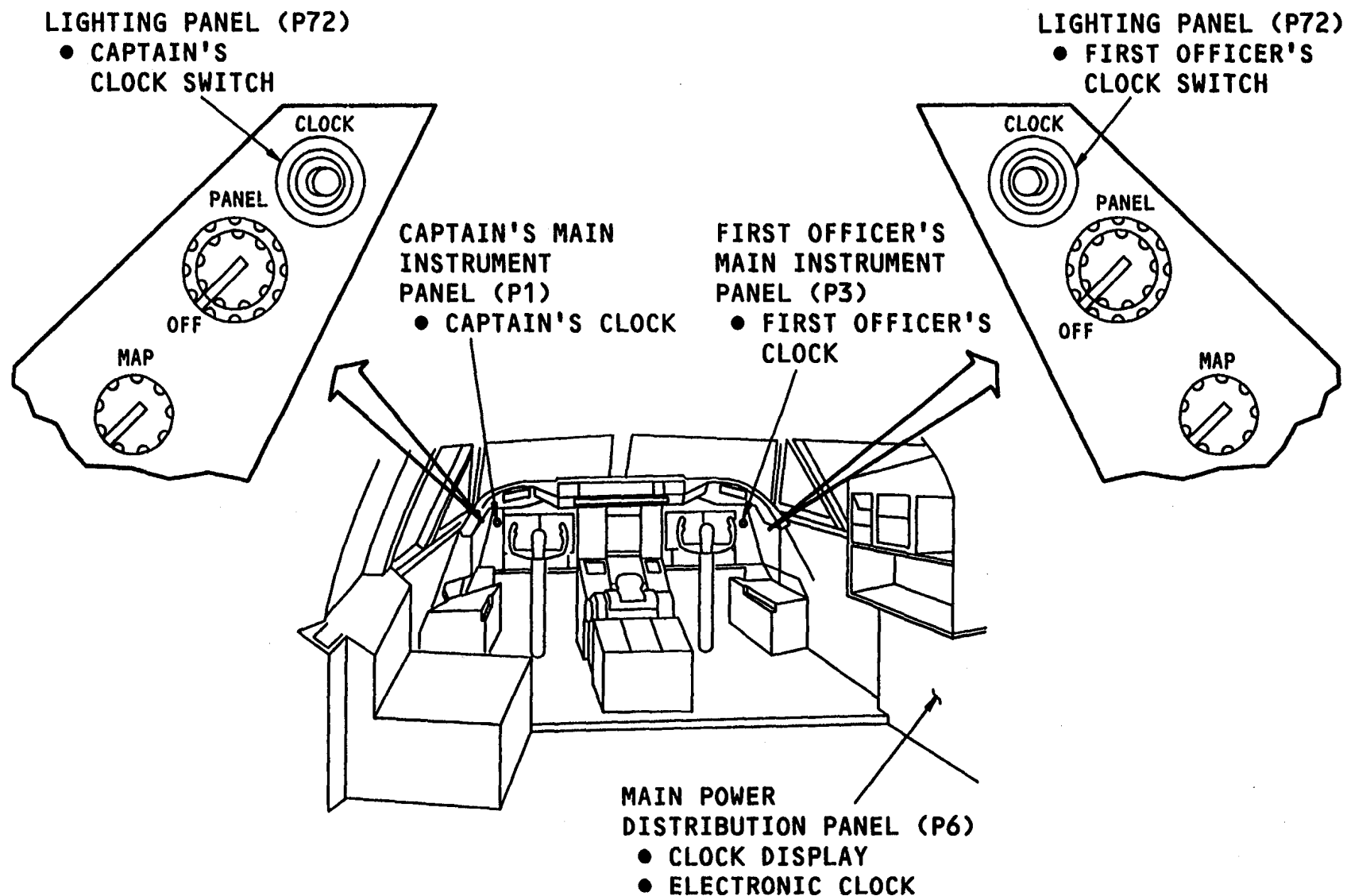


Figure 2 Components Location

INDICATING/ RECORDING CLOCKS



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31-25

INTERFACE DIAGRAM

Power

The clocks get power from the Main Hot, Battery Bus and the APU Battery Bus. With power removed from the airplane, the clock uses the 28 volt dc from the Main Hot Battery Bus as a keep alive voltage to power the clocks time base circuits. When this occurs, there will be no time display or digital output to other airplane systems. When power is applied to the airplane, the clocks monitor power from the APU Battery Bus. If the clock senses voltage on the APU Battery Bus input, power from the Main Hot Battery Bus will power the time base, display and the digital outputs.

Control

The front of the clock contains controls for:

- Elapsed time
- Chronograph
- Date/Time display
- Date/Time set

The chronograph (CHR) function can be controlled by a remote clock switch.

Output

The clocks send universal time coordinated and date from the clocks on an ARINC 429 bus to the:

- flight management computers (FMC's),
- data management unit (DMU) and
- central maintenance computers (CMCs).

L FMC Time/ Date Inputs

Primary source of date and time (UTC) is the GPSSU (Global Positioning System Sensor Unit) or MMR (Multi Mode Receiver) if installed) when INS is in operation.

Secondary source is captains clock.

Back-Up source is F/O clock (via right FMC)

R FMC Time/ Date Inputs

Primary source of date and time is the GPSSU (or Multi Mode Receiver if installed) when INS is in operation.

Secondary source is captains clock (via left FMC).

Back-Up source is F/O clock

EIU Time/ Date Inputs

Primary source of date and time is L FMC.

Secondary source of date and time is R FMC.

DMU Time/ Date Inputs

Primary source of date and time is captains clock.

Secondary source is F/O's clock.

DFDAC Time/ Date Inputs

Primary source of date and time are EIUs.

Secondary source of date and time are EIUs.

CMC Time/ DateClock Inputs

The left and right CMC get time and date from the captains clock.

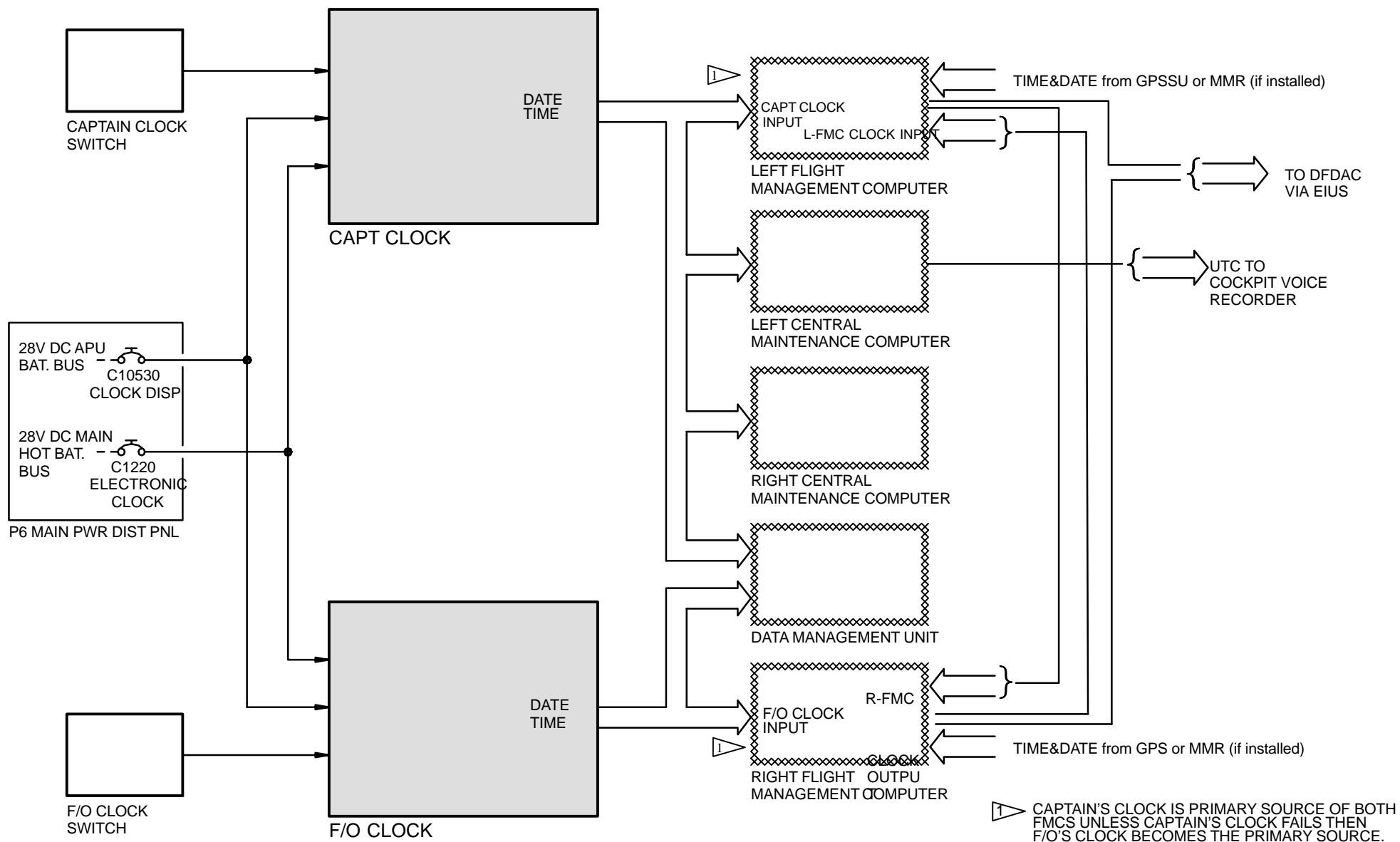


Figure 3 Clock Interface

INDICATING/ RECORDING SYSTEMS CLOCKS



CLOCK

General

The clock shows universal time coordinated (UTC) and date. It also has the capability to measure elapsed time (ET) and has a chronograph function.

Characteristics

Operational characteristics of the clock are:

- Accuracy of +/- one second per two hundred hours at 25°C.
- Power use of displays is 2.0 watts.
- Power use of timebase is 0.6 watts.

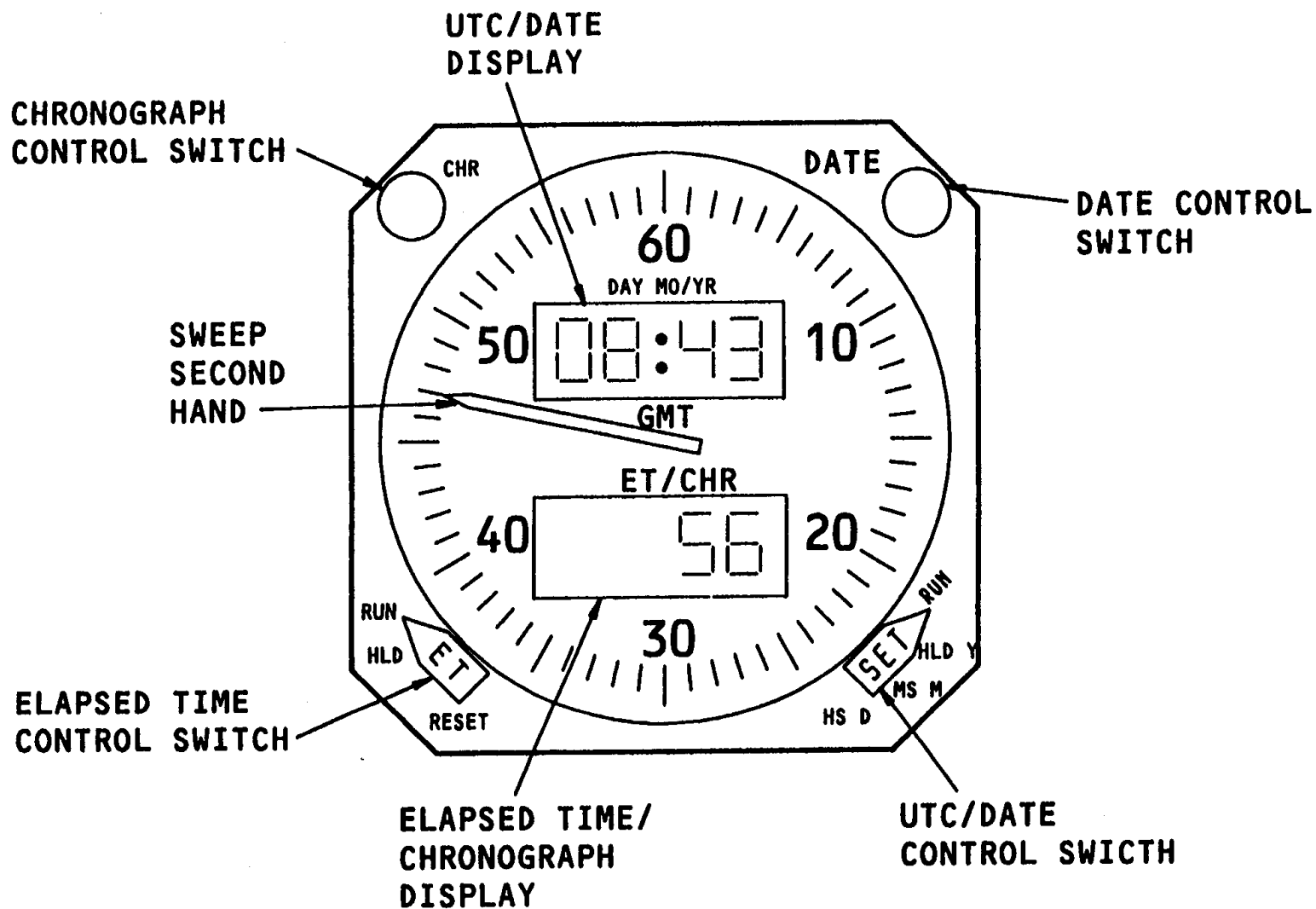


Figure 4 Clock

INDICATING/ RECORDING SYSTEMS CLOCKS



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31-25

Control and Display

UTC is shown continuously on the upper LCD from 00 hours 00 minutes, to 23 hours 59 minutes. The UTC/DATE control switch is labeled SET. It has these positions:

- RUN
- HLD Y (hold/year)
- MS M (minutes slew/month)
- HS D (hours slew/day)

When power is first applied to the clock, the LCDs show all zeros and the sweep hand is at the 60 position. This indication stays until the UTC has been advanced one digit. The date replaces UTC on the UTC/date display when the DATE switch is pushed one time. Day/month, and then year, show alternately for one second each. Day, 1 to 31, shows on the two left digits. Month, 1 to 12, shows on the two right digits. Year, 00 to 99, shows on the two right digits. The colon does not show in the date mode. UTC shows again on the display when the DATE switch is pushed a second time.

When the SET switch is in RUN, UTC shows continuously. When it is set to HLD, the UTC display stays at its present shown value. The MS position of the SET switch causes the minute display to increase at a rate of one minute per second. The HS position of the SET switch causes the hours display to increase at a rate of one hour per second.

To set the time:

Use the DATE switch to show the time.

Use the MS and HS positions of the SET switch to set the desired time.

Move the SET switch to HLD.

Move the SET switch to RUN when the time shown is the same as the actual time.

To set the date:

Push the date switch one time with the SET switch set to RUN. Make sure that the date shows in the display.

Move the UTC/CONTROL switch to the D position. The two left digits update one day per second. Move the switch out of this position when the day shown reaches the necessary value.

- Turn the UTC/CONTROL switch to the M position. Month is updated in the two right digits.

- Turn the UTC/DATE control switch to Y. Year is updated in the two right digits.

There is no required sequence for these steps. After the switch has been set the last time, return the UTC/DATE control switch to the RUN position.

Push the date switch a second time with the UTC/DATE control switch set to RUN, and the upper LCD will return to UTC.

The lower LCD shows elapsed time from 00 hours 00 minutes to 99 hours 59 minutes. The elapsed time control switch is labeled ET. It has RUN, HLD (hold) and RESET positions. The switch is used to start, stop, restart, or reset the elapsed time accumulator.

The ET switch operates as follows:

- In the RESET position, the elapsed time display is blank and the elapsed time accumulator is set to zero.
- The HLD position of the switch causes the elapsed time shown to hold at the present value.
- In the RUN position, time is accumulated from the last hold or reset condition. The elapsed time shown advances from this value.

Chronograph

Chronograph operations replace the displays of elapsed time while the chronograph is accumulating. This does not affect the internal operation of the elapsed time accumulator.

The chronograph (CHR) time is shown on the lower LCD and by the sweep second hand. It shows from 00 minutes 00 seconds to 99 minutes 59 seconds. The two left digits of the LCD are blank. The chronograph control switch is in parallel with the clock switch on the P72 panel. These switches start, stop, and reset the chronograph functions.

The two switches operate the chronograph as follows:

- Push either switch to start the chronograph.
- Push either switch a second time to hold the chronograph accumulator and display.
- Push either switch a third time to reset the chronograph accumulator to zero and return the sweep second hand to 60. Elapsed time is then shown. The display stays blank if the elapsed time accumulator contents are zero.

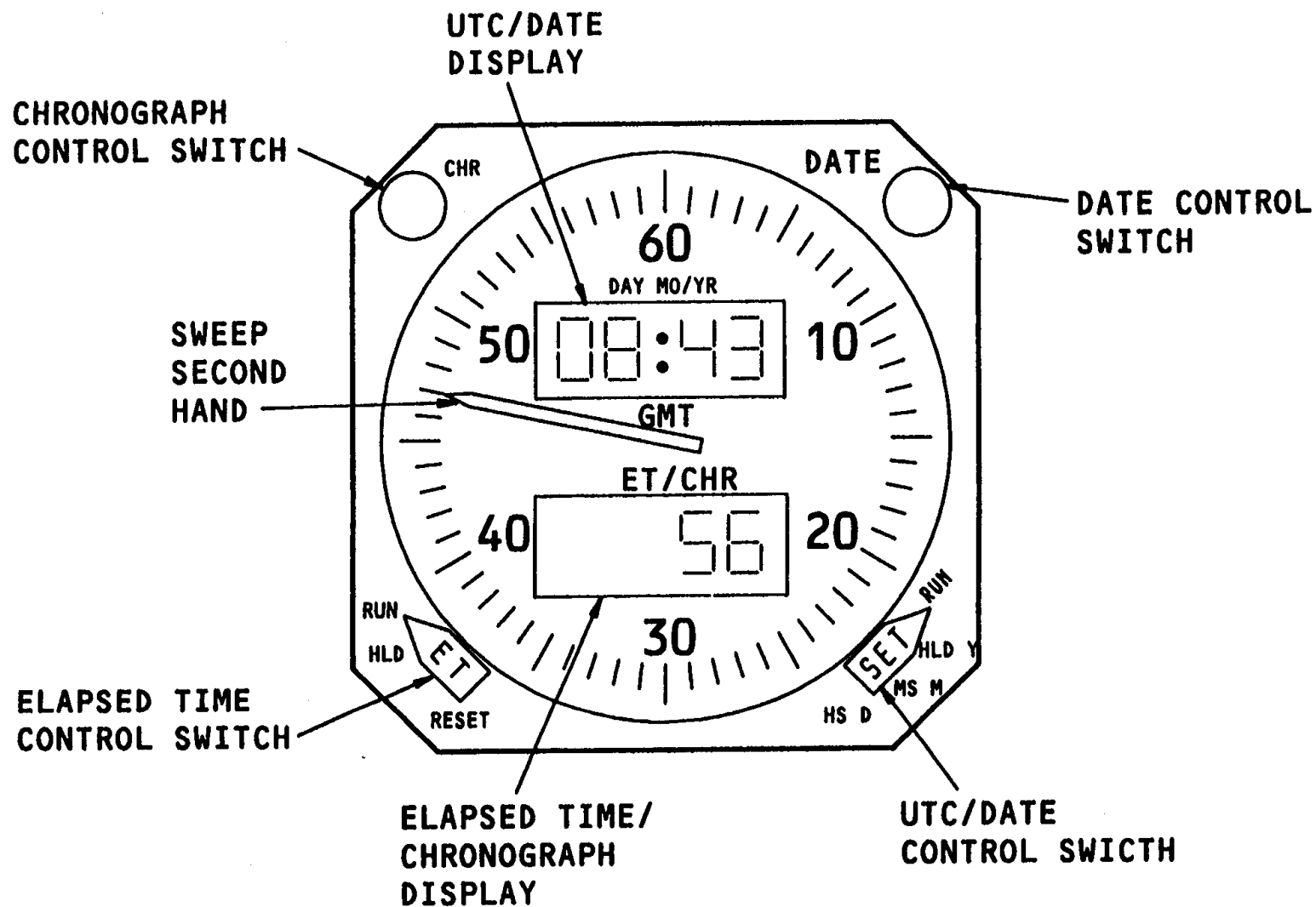


Figure 5 Clock

INDICATING/ RECORDING SYSTEMS CLOCKS



MAINTENANCE PRACTICES

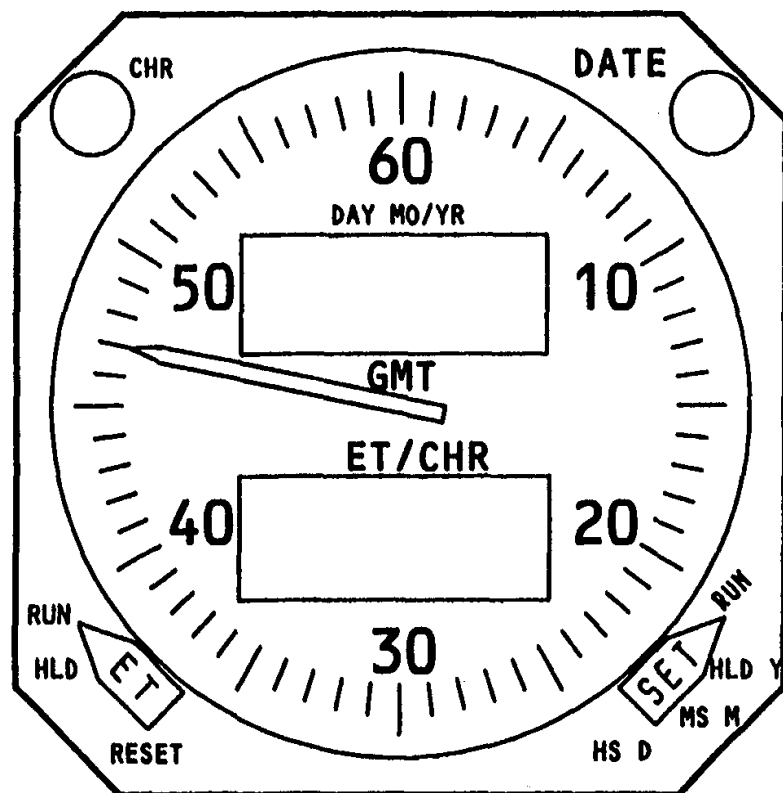
Failure

A failure of the clock will cause the LCDs to be blanked and the sweep hand to remain in its position at the time of failure.

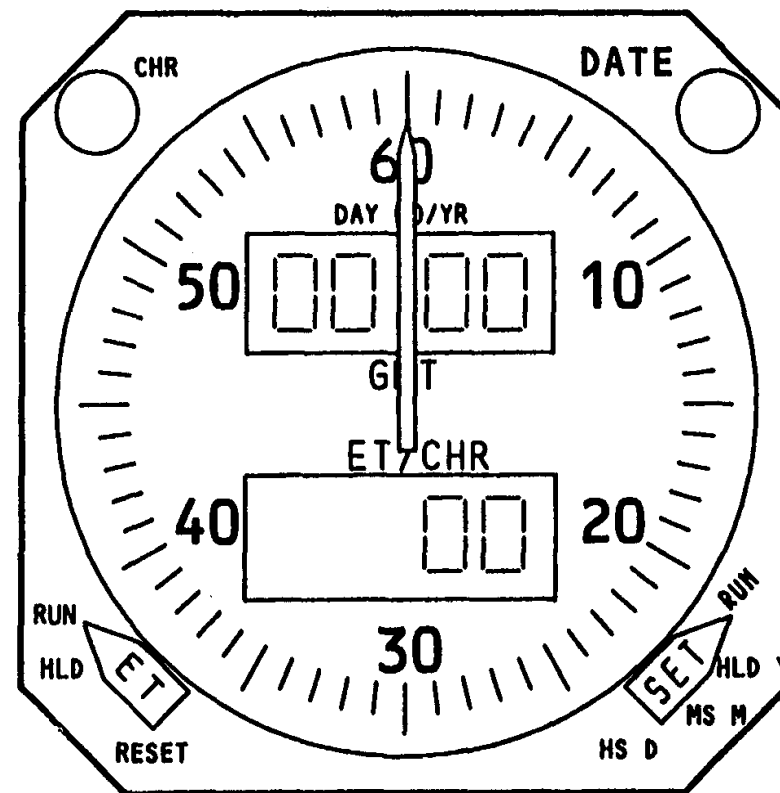
No Computed Data

When the clock has been replaced or power restored to the clock, both LCDs will indicate and hold zeros (00:00).

If the sweep second hand is at a position other than the 60-second position, it will advance to the 60second position and hold. This indication will remain unchanged until the Universal Time Coordinated is advanced one digit with the SET switch placed in the HLD Y position.



FAILED DISPLAY



NCD DISPLAY

Figure 6 Maintenance Practices

TABLE OF CONTENTS

ATA 31-25 CLOCKS	1
INTRODUCTION	2
COMPONENT LOCATIONS	4
INTERFACE DIAGRAM	6
CLOCK	9
CLOCK SWITCH	12
POWER, OPERATIONS AND INPUTS	16
DISPLAYS AND OUTPUTS	18
MAINTENANCE PRACTICES	20

TABLE OF FIGURES

Figure 1	INTRODUCTION	3
Figure 2	COMPONENT LOCATIONS	5
Figure 3	INTERFACE DIAGRAM	7
Figure 4	CLOCK	11
Figure 5	CLOCK SWITCH	13
Figure 6	CLOCK SYSTEM - SCHEMATIC DIAGRAM	15
Figure 7	POWER, OPERATIONS AND INPUTS	17
Figure 8	DISPLAYS AND OUTPUTS	19
Figure 9	MAINTENANCE PRACTICES	21
Figure 10	ABBREVIATION/ACRONYM LIST	23

