MANUAL ENGINE START

Pilots normally use automatic starting to start an engine.
However, manual starting is recommended in the following cases :

- **After aborting a start, because of :**
  - Engine stall, or Engine EGT overlimit, or LO START AIR PRESS, or No N1 rotation, or Hung start.

- **When expecting a start abort, because of :**
  - Degraded bleed performance, due to hot conditions, or at a high-altitude airfields.
  - An engine with a reduced EGT margin, in hot conditions, or at a high-altitude airfields.
  - Marginal performance of the external pneumatic power group.
  - Tailwind greater than 10 knots.
    Starting in tailwind may fail due to N1 counterrotation, hot gas black flow. Fuel should be set to ON at N2 max motoring speed, provided N1 has stopped, and turn clockwise. (confirmation by the ground crew).

MANUAL ENGINE START PROCEDURE

— **THR LEVERS** . . . . . **IDLE**

CAUTION

The engine will start, regardless of the thrust lever position, and will rapidly accelerate to generate the thrust demanded by the TLA, causing a hazardous situation, if the thrust levers are not at idle.

— **ENG MODE selector** . . . . . **NORM THEN IGN**

The lower ECAM displays the engine page.

— **ENG MAN START** . . . . . **ON**

- Do not set the MAN START pushbutton to ON, before all amber crosses, except on N1 and N2, have disappeared on engine parameters (upper ECAM display).
- The N1 and N2 indications show amber crosses, until the actual N1 and N2 reach, respectively, about 3.5 % and 6 %.
- On the ECAM lower display, check that the START VALVE is inline
- On the ECAM displays, check that the OIL PRESS increases, and N2 increases.

● **When N2 reaches the maximum motoring speed (minimum 15 %) :**

The maximum motoring speed is defined as the speed at which a significant decrease in N2 acceleration is observed.

● **If N2 does not get up to 15 %, check that the pack valve autoclosure is functioning. If the autoclosure is functioning, shed APU loads as follows.**

— **GALLEY** . . . . . **OFF**

If needed, shed also :

— **BLUE ELEC PUMP (ground only)** . . . . . **OFF**

— **FUEL X FEED** . . . . . **ON**

— **FUEL PUMPS except R TK PUMP 2** . . . . . **OFF**

— **BLOWER** . . . . . **OVRD**

— **CAB FANS** . . . . . **OFF**

If additional shedding is required, engine pump may be switched OFF (it should be ON for second engine start for PTU auto test).

● **30 seconds after selection of the MAN START pushbutton :**

— **MASTER switch** . . . . . **ON**

The PNF starts the timing for monitoring the light up delay.

– **ECAM displays** . . . . . **CHECK**

Check : – Indication of igniters A and B
– Fuel flow increase (with current EEC std, FF indication spiking occurs at fuel on)
– EGT increases 20 seconds (max) after fuel is on
– N1 increases before 34 % N2.

If the electrical power supply is interrupted during the start sequence (indicated by loss of ECAM CRT's), abort the start by setting the MASTER switch to OFF. Then perform a 30 seconds dry crank.

● **When N2 reaches 43 %**

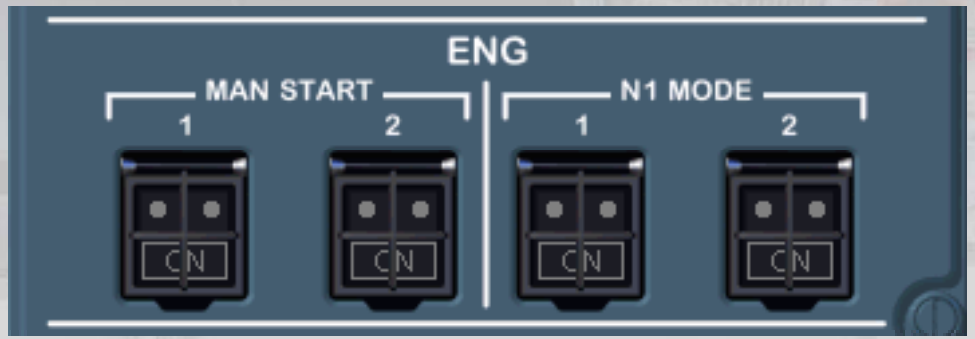
– **ECAM displays** . . . . . **CHECK**

R Check : – Igniter indication off (at 43 % N2)
R – START VALVE crossline (N2 slightly above 43 %)
– Main and secondary engine idle parameters normal.

Gray background on N2 indication disappears.

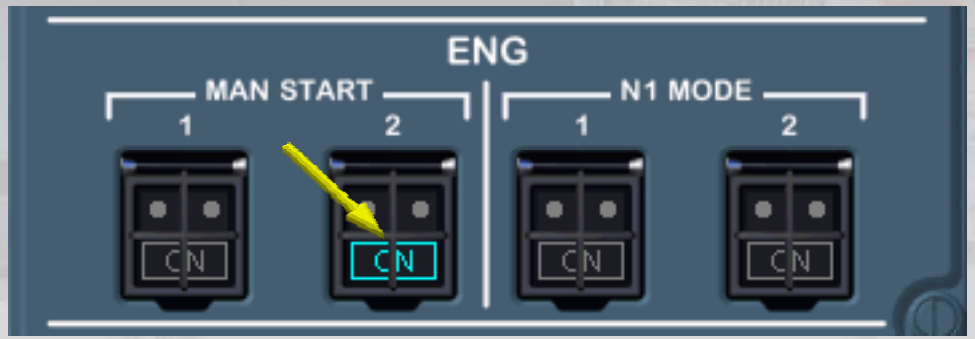
– **MAN START** . . . . . **OFF**

– **ENG MODE selector** . . . . . **NORM**

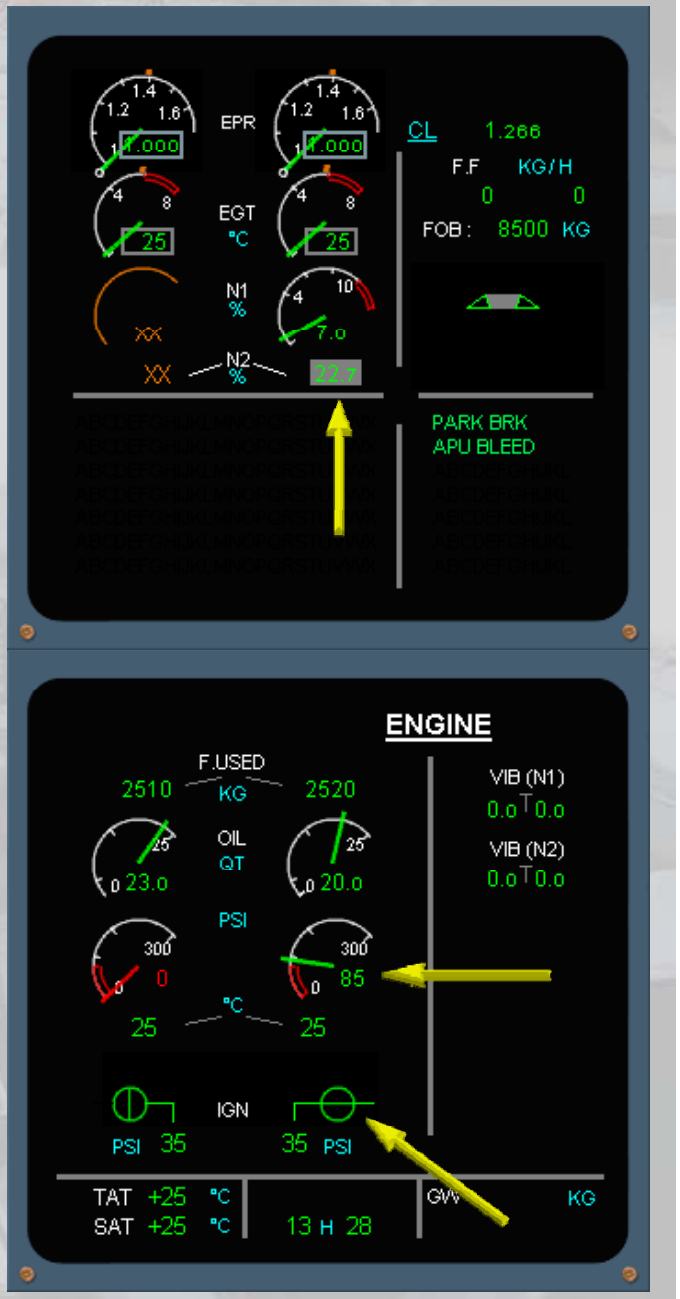

ENG
MAN START
1
2
N1 MODE
1
2
ON
ON
ON
ON

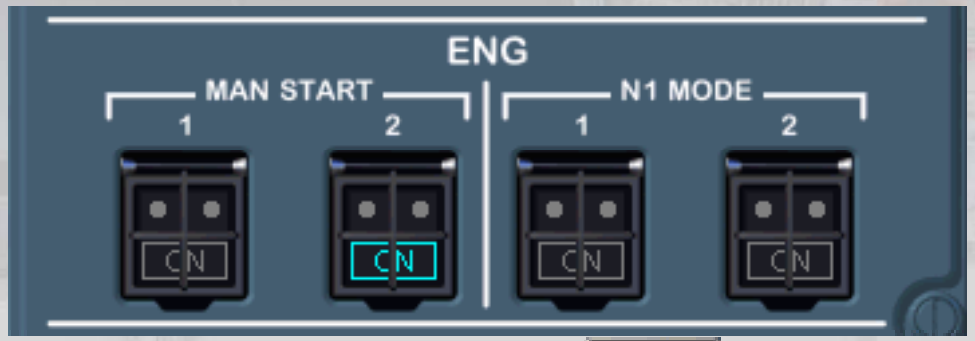

MASTER1
ENG
MASTER2
ON
OFF
ENG
1
MODE
NORM
ENG
2
ON
OFF
FIRE
FAULT
1
FIRE
FAULT
2


EPR
EGT
°C
N1
%
N2
%
CL
1.266
F.F
KG/H
0
0
FOB :
8500
KG
PARK BRK
APU BLEED
ENGINE
F.USED
2510
KG
2520
OIL
QT
23.0
23.0
PSI
°C
25
25
IGN
PSI
35
35
PSI
VIB (N1)
0.0
0.0
VIB (N2)
0.0
0.0
TAT
+25
°C
SAT
+25
°C
13 H 28
GW
KG

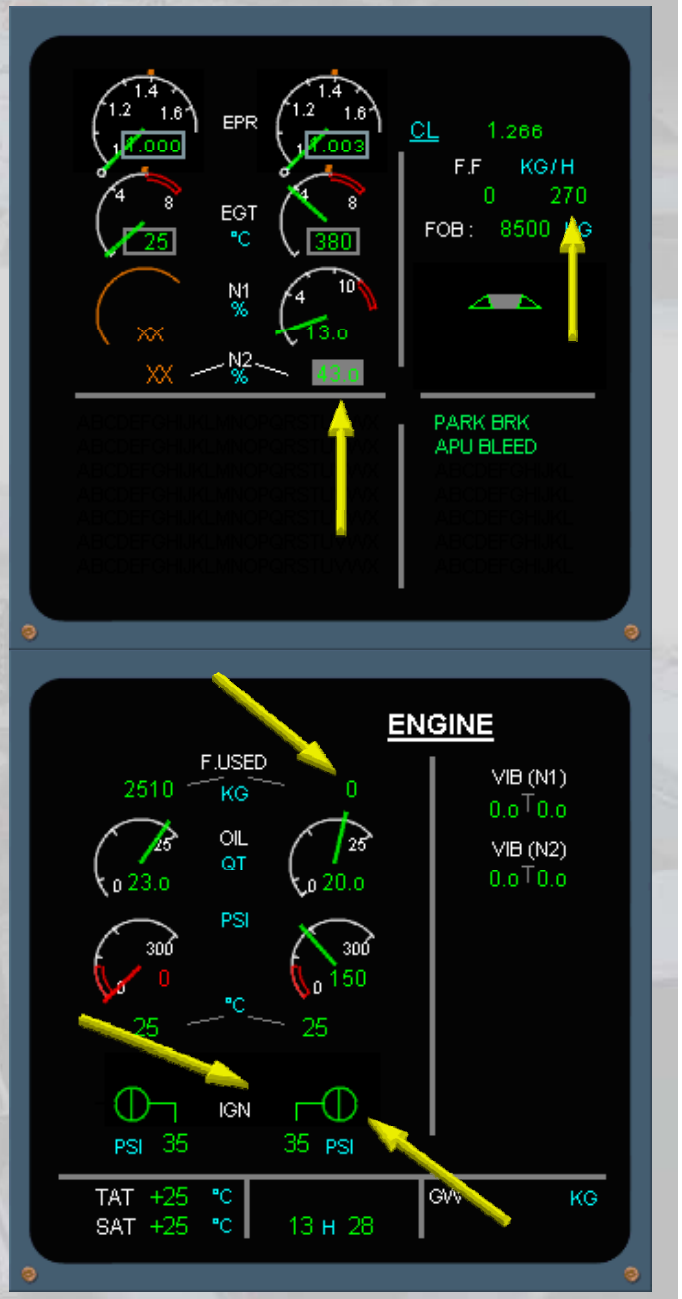

ENG
MAN START
1
2
N1 MODE
1
2
CN
CN
CN
CN

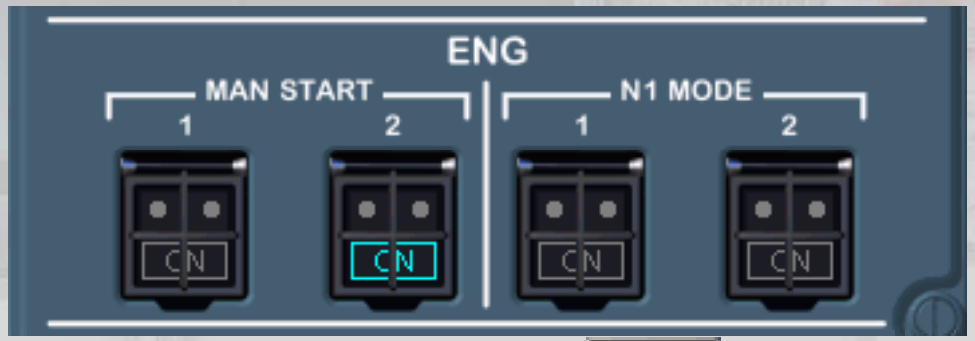

MASTER1
ENG
MASTER2
ON
ON
OFF
ENG
1
MODE
NORM
ENG
2
OFF
FIRE
FAULT
FIRE
FAULT
1
2


EPR
CL
1.266
F.F
KG/H
0
0
FOB :
8500
KG
EGT
°C
25
25
N1
%
N2
%
PARK BRK
APU BLEED
ENGINE
F.USED
2510
KG
2520
OIL
QT
23.0
20.0
PSI
85
°C
25
25
VIB (N1)
VIB (N2)
IGN
PSI
35
35
PSI
TAT
+25
°C
SAT
+25
°C
13 H 28
GW
KG


ENG
MAN START
1
2
N1 MODE
1
2
ON
ON
ON
ON


MASTER1
ENG
ENG 2
ON
OFF
ENG 1
MODE
NORM
IGN START
OFF
FIRE
FAULT
1
FIRE
FAULT
2

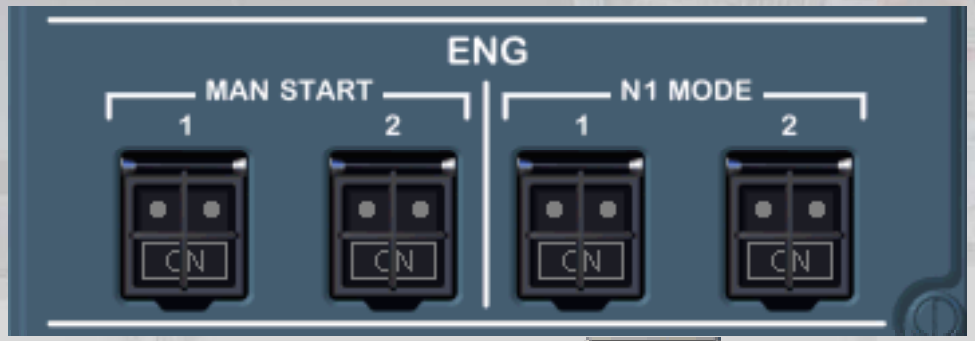

EPR
1.000
1.003
EGT
°C
25
380
N1
%
13.0
N2
%
43.0
CL
1.266
F.F
KG/H
0
270
FOB :
8500
KG
PARK BRK
APU BLEED
ENGINE
F.USED
2510
KG
0
OIL
QT
23.0
20.0
PSI
0
150
°C
25
25
IGN
PSI 35
35 PSI
VIB (N1)
0.0 0.0
VIB (N2)
0.0 0.0
TAT +25 °C
SAT +25 °C
13 H 28
GW
KG


ENG
MAN START
1
2
N1 MODE
1
2
ON
ON
ON
ON


MASTER1
ENG
ENG 2
ON
OFF
ENG 1
MODE
NORM
IGN START
OFF
FIRE
FAULT
1
FIRE
FAULT
2


EPR
1.000
1.003
EGT °C
25
414
N1 %
21.3
N2 %
58.0
FLX 1.302 45 °C
F.F KG/H
0 270
FOB : 8500 KG
PARK BRK
APU BLEED


ENGINE
F.USED
2510
KG
0
OIL QT
23.0
20.0
PSI
0
150
°C
25
25
IGN
PSI 35
35 PSI
VIB (N1)
0.0 0.0
VIB (N2)
0.0 0.0
TAT +25 °C
SAT +25 °C
13 H 28
GW 62000 KG


ENG
MAN START
1
2
N1 MODE
1
2
CN
CN
CN
CN


ENG
2
MASTER1
ENG
ON
ON
OFF
ENG
1
MODE
NORM
IGN
START
OFF
FIRE
FAULT
FIRE
FAULT
1
2


EPR
1.000
1.003
EGT
°C
25
414
N1
%
21.3
N2
%
58.0
FLX
1.302
45 °C
F.F
KG/H
0
270
FOB :
8500
KG
PARK BRK
APU BLEED


ENGINE
F.USED
2510
KG
0
OIL
QT
23.0
20.0
PSI
0
150
°C
25
25
IGN
PSI
35
35
PSI
VIB (N1)
0.0
0.0
VIB (N2)
0.0
0.0
TAT
+25
°C
SAT
+25
°C
13 H 28
GW
62000
KG