NRST - AILA - AIRBORNE INSTRUMENT LANDING APPROACH SYNTHETIC ILS
NAVIGATION - APPROACH - ILS FACILITY

This instrument provides potent capabilities for En route navigation , circuit alignment and subsequent approach utilising ILS style guidance to landing touchdown.

The instrument consists of 4 pages within an MFD , it is initially entered at the lower bezel NRST button.
    Pages 1 to 3 relate to any of the 24,000 airports that are in the database .
* Page 1 - select an airport from the list of 16 nearest airports ,
            or,
            enter any airport ICAO into the search facility.
* Page 2 - select a runway from the list.
* Page 3 - select which runway end is to be used.
* Page 4 - allows a similar function either on land or water at any location on Earth.

Following the initial selection of an airport , an individual runway can be selected , and then either of the runway ends can be selected.

A precise touchdown point for that runway end is then automatically created with the following properties , Latitude/Longitude , Elevation , and Runway Heading.
" The Runway Heading forms a continuous extended runway heading axis line. "
The Touchdown or ILS aim point becomes the focal point to which distances , bearing , glide slope , and ILS are calculated and displayed as text readouts , and arrow/needle - ILS deviation bar graphics.

This in turn enables en route navigation to the airport from any distance , then when at a closer proximity to the airport/runway it aids in an informed manner the transition to various forms of circuit pattern alignments.
These alignments are generally to progressively turn the aircraft around to an intercept with the initial run in heading , or actual approach Runway Heading to facilitate a ILS glide slope capture , and landing.

The forth page enables the capture of any location that is below the aircraft at that instant , and provides similar functions including ILS capability to that location.

The above capabilities can be used in any civil or military aircraft , or in VTOL vehicles such as helicopters , Harrier , or AV8 .
The GS - Glide Slope can be set to any desired angle , thus benefitting VTOL that might require a steeper ILS approach or military aircraft that require precise dive run in angles all with ILS guidance provided.
The VTOL can also conduct absolute vertical hover let downs with it by using the Orange Bearing arrow and the Distance readout , accuracy is within one foot of target aim point.

Note ; Please ignore any reference to , Stand Off , Flight Plan Editor and Radar , where ever they might appear , they are not applicable to these notes .

Page 1 - Airports Listing.

PAGE 1 = APT = NEAREST AIRPORT LIST AND SEARCH

Click the NRST button.

1. The Nearest 16 airports listing , Page 1 will become visible.
Choose the airport that you wish to use , then Click on the left hand side of that line ,
the selected airport will be indicated in more detail at the lower portion of the display, and
it's airport **ICAO** will appear in the third button down on the Right side.
Click that button to proceed to Page 2 for a Runways Listing.
 OR ,
2. If you require an airport other than shown in the 16 listing , then ;
Click the top Left **ICAO** button ,
then type on your keyboard the airport ICAO of the airport that you desire to use.
It will then automatically proceed to the Page 2 runway listing.
You can type in any of the 24,000+ airports that exist in the flight simulator database.

Proceed to page 2 by clicking on the **ICAO** button , third down on right side.
It displays your selected airport ICAO , ' YAMB ' in the above example .

Note , in the title header line the **>02000** is a **+ or -** click zone.
By altering the value to for example >05000 the listing will change to only display
airports that have runway lengths of 5,000' or greater .

On the right side above the Page selection buttons are detailed , Page 4 only
has the **APT** button to navigate back to the first three pages.

Page 2 - Runway Detail Listing.

PAGE 2 = ICAO = RUNWAY LISTING

Amberley ADF Military   0.4ₙ
Amberley, Queensland   318°
YAMB   91ft
S27°38' 25"
E152°42' 42"
Rw 1: 15-33   147° 10022 x 148ft Asphalt
Rw 2: 04-22   043° 5002 x 148ft Asphalt
Rw 3: 10-28   093° 1388 x 115ft Grass
Rw 4: 15R-33L 147° 1968 x 112ft Grass

Page 2 button displays either ---- or ICAO of airport that was selected at page 1 .

PFD NAV FREQ NRST TGT

Click on Left side of any runway line , the selected line will change to orange colour.

 On page 2 you will have a list of all the runways that exist for the chosen airport.
Click on the left end of the runway line that you wish to use,
on selection that line will change from green to orange.

Proceed to page 3 by clicking on the **APP** button , forth down on right side.

* * * * * * * * * * * *

Critical Fundamentals of Page 3 and 4 .

1. Rwy Hdg = Mk Hdg = Hollow Grey arrow direction.

2. Hollow Grey arrow represents the runway and it's direction.

3. The base of the Hollow Grey arrow is at the Touchdown aimpoint.

4. The Orange arrow , Bearing , and Distance represents the direction and distance
   to the Touchdown aimpoint.

5. The point of the Orange bearing arrow should always be thought of as resting
   at the base of the Hollow Grey arrow. This gives a visual image of where the
   Runway is relative to your aircraft and the angular relationship.

6. The Rwy Hdg becomes a continuous "Extended Runway Heading Axis Line".
   The "Circuit Width" is the offset distance in Nautical Miles to the closest
   portion of that axis line.

* * * * * * * * * * * *

Page 3 - Selected Runway ILS Approach details.

 Click **RWY** button to toggle/cycle between either of the 2 available runway
headings , note that the top right Rwy Hdg also changes to reflect the selection made.
If you wish to use another runway navigate back to page 2 to select a different
runway.

 At Page 3 the display depicts the specific runway that was previously selected .
For landing purposes all runways have two ends , either can be used .
  Initially the display configuration is for one of those ends , the other end of the
runway can be toggled (selected) by a click at the top left RWY button , the display
then instantly configures to represent data for the end now selected.
  The display only relates to the currently selected end of the runway.

  This display has a considerable amount of data to facilitate a variety of uses that are
associated with , initially getting to the vicinity of the runway , then when close
manoeuvring the aircraft into any desired circuit pattern to allow it to be progressively
turned onto an approach , then when on approach it provides ILS style landing
guidance indications if desired .
Most importantly , it gives the pilot all the information that he needs to smoothly
transition from en route , to circuit pattern , to approach , to landing.

  It enables two different styles of approaches to be conducted .
(A) the normal command ILS deviation bars.
(B) using the Rwy Hdg/Brg arrows and readouts , in conjunction with the
       current GS readout kept at a constant value.
The above (B) can be of use to those wishing to avoid using the IlS bars , as they can
be intimidating to some users.   This is the method that is shown in the
"Standard Rectangular Circuit Pattern" example diagram.

 Page 3 has several distance readouts that provide valuable information.
Possibly of most interest is the "Circuit Width" , it enables the pilot to fly a course
that is parallel to the Runway Heading axis line by keeping that value constant ,
as can be appreciated , this is exactly what a pilot does when he is flying the
Downwind leg of a circuit , it enables absolutely precise circuits to be flown in an
easy manner.

The **ARR** and **ILS** buttons are On/Off switches for these graphics , ensure ILS is
selected on.

The on screen area where the airport name is located is a click zone for three text data
overlays that may be of use , click to cycle .

The **GS** button enables the glideslope value to be set , by default it is the usual 3.00 degrees ,
but any value in the range of 0 to 90 degrees can be entered in the Multiplex , then set at the
GS button.
The instrument bases it's calculations on the set GS value , the ILS deviation bars will provide
guidance to any set value , this can be of use for helicopters or VTOL aircraft wanting a
steeper approach .
The currently set value is indicated next to the GS button.

The **DME** button selects the DME **slant distance** readout in nm from the touchdown point ,
enables DME arcs to be flown if desired , the 3 decimal places give trend indications.
Note , all the other distance readouts are horizontal distances .

The **INT** button displays (A) the Intercept pane and (B) the blue arrow , enter a distance in the
Multiplex unit , then activate it by clicking the blue ***SET*** , this generates an intercept
location at the set distance in nm on the Run In line prior to the touchdown point , it facilitates
interception and alignment with the runway heading , similar to a FAF -Final Approach Fix .
It also calculates an S-HT (height above runway surface) for the intercept position , to
indicate that the aircraft must descend from cruise altitude to the S-Ht to accurately transition
to the ILS pathway.

Centrally on the display you will see selected airport and runway detail , and to the right ,
- **GS** = current actual glideslope angle readout .
- **time** = To/From at current groundspeed .
- **S-Ht** = aircraft's current height above the **ACTUAL** runway surface .
- **DIST** = aircraft's current distance from the selected Rwy Hdg touchdown point .
Distance readout is in feet if less than 10,000' , and in nm if distance is greater.
- **Cct Width** = Circuit width or offset , it is the distance in nm from the closest portion of
the extended Rwy Hdg axis line , the Left/Right and F/R (F/R = front or rear) indicate
which quadrant you are currently in relative to current touchdown point and Rwy Hdg .
- **Appr** = Approach distance in nm (Right click at ARR button) , this readout only exists
in the Rear 2 quadrants , it is the distance from your aircraft aligned to or parallel to Rwy Hdg
relative to the lateral quadrant axis.

Page 4 - Mark Position .

MK button
L = On switch captures and displays Mark Position.
M = To Stand Off
R = Off switch

ARR button
L = Arrows On/Off
R = Appr , agl text On/Off

M.1 button = memory 1
R = Stores current display data
M = To Stand Off
L = Recall stored data

M.2 button = memory 2
R = Stores current display data
M = To Stand Off
L = Recall stored data

MH button
L = To set Mark Heading value from Multiplex window

ELV button
L = To set Elevation value from Multiplex window.
R = To set current Stand Off Lat/Long to Mark Position Lat/Long.

PAGE 4 = M.P = MARK POSITION

Mark Position   357.8   Mk Hdg 327.5
                         Brg 332.4
                         Offset
                         1099'
Appr
2.10 nm   147
                         7859
00 : 20   GS 2.95
G Elev   91   S-Ht   661
Mk Alt 132   Dist 2.11 nm   327
   Cct Width   0.18 nm Left R
   7 8 . 5 9 Clr   3.00

Click zone to cycle through Offset or DME distances.

Dist

Offset
1099'

DME
2.111

MULTIPLEX digit entry and display window.
L , R , MWU , MWD.

Mark Position   357.8   Mk Hdg 327.5
                         Brg 332.4
                         DME
                         2.111
Appr
  2.10 nm   147
                         7859
00 : 20   GS 2.95
G Elev   91   S-Ht   661
Mk Alt 132   Dist 2.11 nm   327
  Cct Width   0.18 nm Left R
   7 8 . 5 9 Clr   3.00

APT button to return to page 1.

ILS button ILS deviation bars On/Off.

FAR button = Far End of Rwy.
R = Generates and stores the Reciprocal of the Original Rwy end at Rwy length ahead of Original end.
M = To Stand Off.
L = Recall stored Far End data.

RWY button, L = Sets Rwy length from Multiplex window.

ORIG button = Original End of Rwy.
R = Stores the current display data and feeds to Far End Rwy facility.
M = To Stand Off.
L = Recall Orig End stored data.

GS button
L = To set Glideslope value from Multiplex window.
R = To cycle through Lat/Long formats.

Button decodes :
L= Left ; R = Right ; M = Middle click .
MWU = Mouse Wheel Up ;
MWD = Mouse Wheel Down.

At Page 4 a click of the **MK** button captures the current location , we will call it the Mark Position , it then displays data relevant to that position .
The captured Mark Position can be anywhere on Earth , on land , on water , or on hardened rooftops .

The data relevant to the captured location is the basis of the display.
This display data can be stored to memory by a **Right** click at the **M.1** , **M.2** or **ORG** buttons , later each stored location can be recalled by a **Left** click at the respective button.

Once the data is stored at these buttons the MK button can be used to capture other locations if required .

The three buttons , **ORG** - Original End , **RWY** - Runway Length , and
FAR - Far End , exist specifically to enable the creation of what is termed a
"Generated Runway" , this facility enables precise ILS style landing guidance.
These Generated Runways can be anywhere that you want , a paddock , a roadway,
a rooftop , or in the case of floatplanes , a lake , a river , or at sea .

This greatly expands the operational use of a wide variety of aircraft types over an
equally wide range of location types .
Aircraft types , GA , civil , military , floatplanes , helicopters , and vertical
take off jets .
The scale of operations conducted by those types is only limited by the operators
imagination and ingenuity .

The GS -Glideslope can be set to any value within the range of 0-90 degrees.
This is handy for either helicopters conducting a steep approach , or military aircraft
doing either a bombing or strafing Run Ins .
Helicopters can conduct an absolute vertical hover let down by using the
Orange Bearing arrow together with the Distance readout with an accuracy to within
one (1) foot of target touchdown .

The Offset Distance in feet readout is for military aircraft to conduct offset bombing
runs at any distance in feet from the primary Mk heading axis line , that offset
distance is the same as the 'Circuit Width' distance , except that the latter is in nm .
The Offset distance in feet can also be of use to cropdusters doing repeated
cropdusting parallel runs , each spaced x feet apart , it could possibly be used in
fire fighting where the 2nd and 3rd runs might be offset from the initial run.

The Mk Alt is the altitude of the aircraft at the instant of capture of the Mk Position
it can be used either as a 'do not descend below altitude' in low flying circumstances
where visibility is an issue , or it can represent the initial 'Holding Pattern' altitude.

An underlying aspect of this instrument was to place in the hands of the pilot the
maximum of options and flexibility , then leave it's use up to his discretion.
In any limited display area the real danger is clutter , and yes there is a little of that
here , an attempt has been made to reduce clutter by having On/Off switching for
various aspects , thus the pilot selects what he needs according to circumstances.

Important Note ;
Most of the previous Page 3 descriptive notes apply equally to Page 4 , generally
Page 3 and 4 display functions and data are similar , therefore will not be repeated
here , refer back to Page 3 notes .

***   * * *   ***

Buttons **ORG** - Original End , **RWY** - Runway Length , **FAR** - Far End , are there to specifically enable the creation of a " double ended Generated Runway " anywhere .

1. Click the **MK** button to capture a location , then Right click **ORG** button to store
   that location to memory as the initial end of a runway.
   The **ORG** button enables the generation of a double ended runway .
   The location stored to memory in the **ORG** button becomes the "Original End" of
    the generated runway with the runway heading shown next to the button.

2. Then the pilot must determine or make an estimate of the length of the generated
   runway , that estimated runway length is then entered in the Multiplex unit at
   the lower screen , the length is then set by a Left click on the **RWY** button ,
   that length will be shown next to the button.

3. With both the Original End and Length of runway set the Far End can be created.
   The "Far End" of the runway is now created and stored by a Right click at the
    FAR button , it's runway heading will now appear next to the button.

4. Having stored to memory both the "Original End" and "Far End" of this generated
   runway either end can be toggled or recalled at any time by a Left click of the
   applicable labelled button as desired. The recalled runway end will then become
   the subject of the display , with each having distance , bearing , and ILS .

5. If required at a latter stage the **ORG** and **FAR** button memories can be
   over written with a new generated runway by repeating the above procedure.

6. The **M.1** and **M.2** memory buttons are provided to enable storage of other locations
   if desired , they could be used where repeated trips are made between various
   geographically separated locations , or as required by the pilot.

***   * * *   ***

The Mark Position function of Page 4 , entailing the capture of any location ,
anywhere on land or water opens up some very interesting capabilities.
Helicopters can land on hardened rooftops and capture that spot , the distance back to
that spot is precise to one (1) foot and likewise the S-Ht will deliver back at exact
height.
Float planes can generate runways at sea , on rivers or lakes and conduct ILS
precision landings , and return as often as desired to that exact location.
Military aircraft can conduct with ILS precision bombing or straffing Run ins,
with or without offset distances applied , also some nations use roadways for take
off/landing of aircraft or Harrier jump jets , this unit enables these places to become
generated runways.
Helicopters , crop dusters , gliders , and fire fighting aircraft make use of either
paddocks or lakes for their operations , with this instrument the pilot is able to
locate or find an obscure difficult to see location and then do a precise landing.

Special Note ;
With this unit it is possible to shuttle between Page 3 and Page 4 , as long as
locations in page 4 are stored to memory .
Affectively it means that an Aircraft can make repeated flights between an
airport that is in the database and a obscure paddock hidden in the countryside ,
and conduct ILS landings at either place.

DISPLAY SCREEN INDICATIONS PAGES 3 AND 4

 Page 3 is depicted below , however some elements are common to Page 4.

Rwy Hdg is basically equivalent to , or same as Mk Hdg.
Hollow Grey arrow represents Grey Rwy Hdg or Mk Hdg text.
Orange arrow represents Orange Brg and current Distance to Aimpoint text.
S-Ht is the Height in feet above the Runway Surface.
GS is Glideslope angle.

The following can be switched On/Off as desired ;
DME , Appr , Intercept Pane , Arrows , and ILS bars .

The ILS bars indications below are common to both Page 3 and 4 .
The degree values below are the +/- range , Left or Right and Top or Bottom to the
limits of the tolerance box . The ILS tolerances shown below are applied to
whatever GS angle that is currently set by the pilot and being flown.
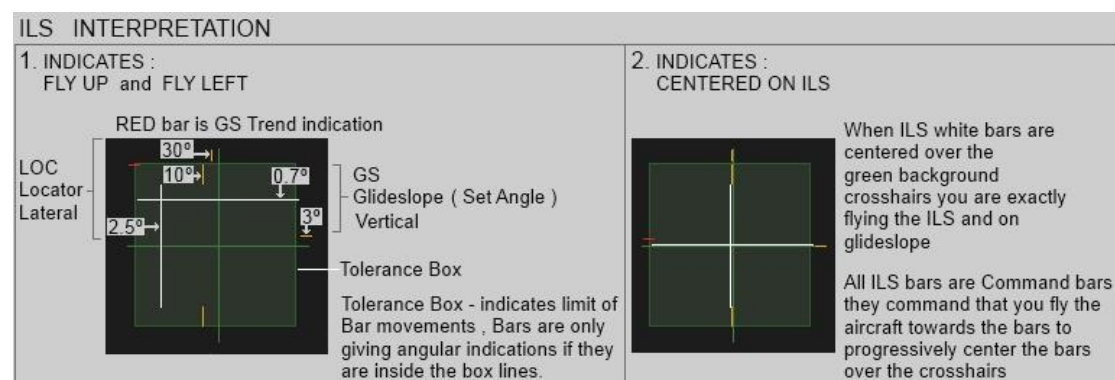
IMPORTANT
The following "Standard Rectangular Circuit" should be flown in or with both
Pages 3 and 4 .

When flying take careful note of the relationship of the Hollow Grey arrow to
the background crosshairs , it informs the pilot which leg of the circuit he is on and
helps to keep the circuit rectangular.
Also take note of the Orange Bearing arrow it always points to the Touchdown
aimpoint on the runway , and it identifies the abeam position.
The Circuit width aids with when to turn downwind , generally a circuit height
(S_Ht) of 1,000' is flown and the Circuit width would be approximately
1.25 to about 1.35 nm wide.
Flying that diagram aids in orientation or building a mental picture of what the display
is telling the pilot.
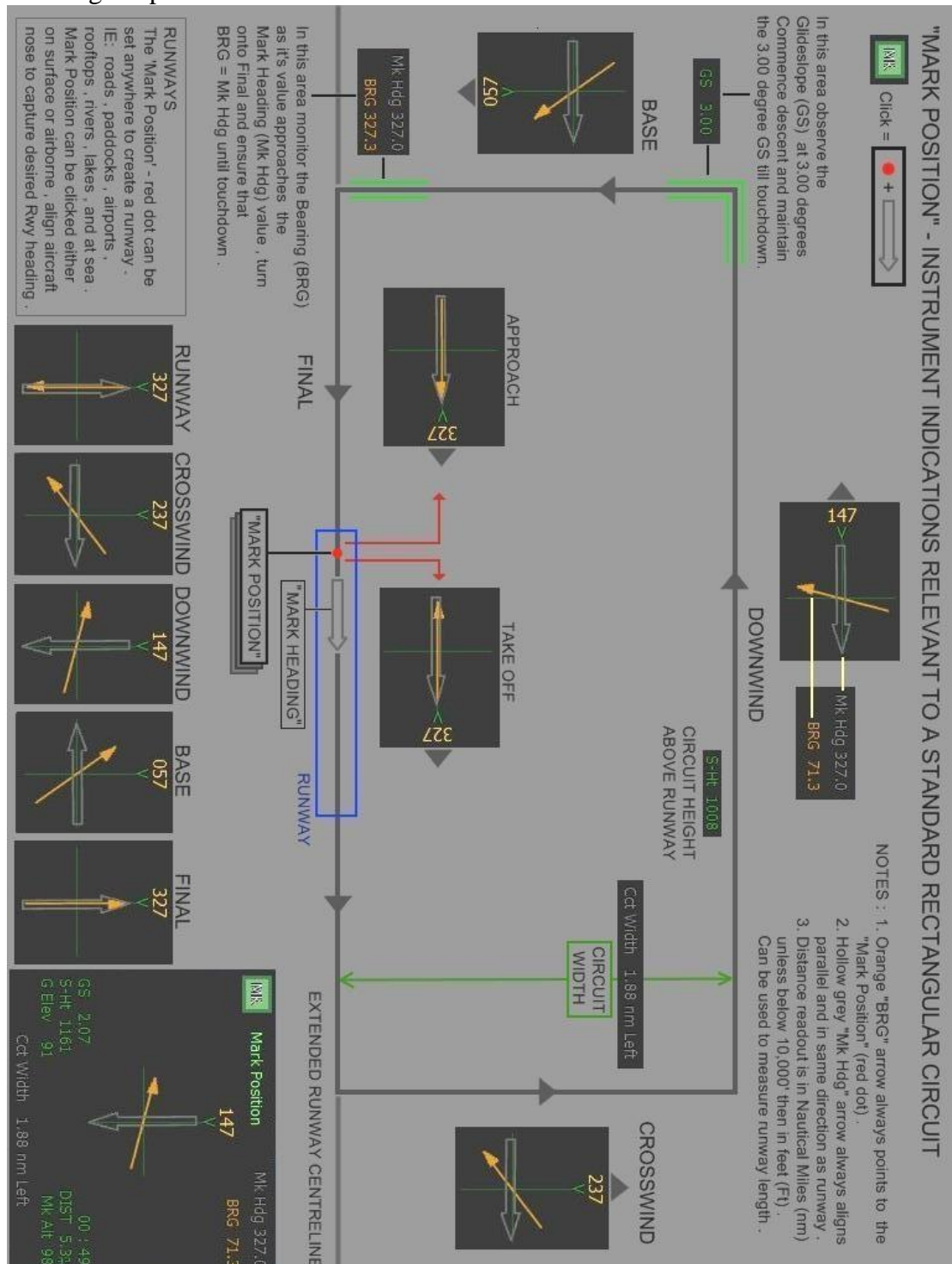
These are the required digit formats for use of Multiplex entry.

Text data overlay click on display screen to cycle through series.

A sample exercise using Pages 1 to 3 .
An in use example ;

In flight , at page 1 select an airport ahead of your aircraft ,
then at page 2 select a runway ,
then at page 3 select the Runway Heading and switch ILS On.

Turn the aircraft to get the orange arrow to match the aircraft heading , observe
the Distance .
You are now heading directly towards your selected runway touchdown point.
Next ;
Observe your Circuit width distance,
in this example when we are at circuit width of 10 nm we will turn onto a
reciprocal heading to our Rwy Hdg , basically that puts us on a downwind leg
at a 10 nm offset from the runway centre line.

Maintain this reciprocal heading and observe the orange bearing arrow it will progressively
turn till it gives an abeam of your touchdown spot.
At the abeam time the Appr distance (Right click ARR button) will start giving distance
readouts.

Maintain your reciprocal heading still at a circuit width of 10 nm.

What we are aiming for is a 45 degree intercept of the Runway Heading at a distance of
10 nm out from touchdown point (ILS aimpoint) .

At Appr Distance of 15 nm , turn aircraft 90 degrees towards runway axis line , your
Appr Distance should now remain constant at 15 nm.
At 5 nm circuit width reading , turn 45 degrees towards the touchdown position.

We are using the fact that the 2 sides of a right angle triangle with included angles of 45
degrees are
equal , thus turning at 5 nm from axis line will translate to 5 nm closer at intercept ,
ie ; 15 -5 = 10 nm , and the final 45 degree turn onto the axis is easier to do accurately.

Observe circuit width , as it approaches 0.0 nm , turn 45 degrees onto final approach runway
heading ,
you should now be 10 nm to go to touchdown.

Transfer full attention to ILS deviation bars , as you progress you should get both centred and
maintain them central to touchdown.

Having the aircraft stabilised and trimmed by 7 nm helps when manually flying the ILS.
As per usual small smooth inputs are critical , especially as you get to the pointy end
of the ILS cone where the ILS is extremely sensative to even the smallest imputs.

Above is just an example to use the 3 distance measures available and to apply them ,
En route , circuit or airport vicinity , approach , runway heading intercept and ILS.

TIP : orientation , imagine the Tail of the Hollow Rwy Hdg arrow sitting on the very
pointy tip of the orange Bearing arrow , it enables you to visualise your current
disposition relative to your runway at all times.

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Page 4 - Mark Position ILS Approach Details .
 MARK POSITION INSTRUMENT GENERAL NOTES

1. BRIEF DESCRIPTION
  This instrument enables the pilot to capture and store any location.
At a click of a button it captures the instantaneous location of the aircraft as a
Latitude/Longitude position , it's heading , and the ground elevation under the aircraft at that
instant .
  With that information stored , it then conducts various calculations , such as the
Distance and bearing back to that location , but it also generates other useful information .
This information is then displayed as both visual graphics and text.

  It has several storage and retrieval buttons that enable multiple locations to be stored and
viewed.

  Both the presentation and the adaptability of the data and display enable this instrument to
be utilised in several ways.

2. USES
** To have guidance to return to that exact location.

** Enables a uniform descent to be conducted from any distance.

** To generate a Runway at any location , without any limits.

** Enable precise and informed rectangular circuits to be conducted at these
   generated runways.

** It enable two ends of any runway , anywhere to be set , thus enabling ILS
   precision approaches to be made at either end.

** To conduct repeated Approaches and Landings at a precise location .

** Runways can be , roads , obscure paddocks , hardened rooftops , any airports ,
   mountain tops , rivers , lakes , or at sea , anywhere at all.

** Provides ILS precision guidance bars to maintain an exact Glideslope angle .

** The Glideslope can be set at any angle including the usual 3.00 degrees .

** The ILS style precision approach can be conducted at any location without limits.

** The ILS automatically compensates for any crosswinds on approach.

** Enable low or zero visability approaches to be conducted with confidence.

** Dive bombing can be conducted at any angle with ILS precision guidance.

** Holding pattern , at a click , the Mark Position becomes the Holding Fix , Mk Hdg is the
   Inbound Heading , Circuit Width would constrain the timed outbound heading , enables
   accurate Holding at any location.

** Can be installed in any aircraft or helicopter.

** Specifically useful for , cropdusters , firefighting , floatplanes , GA aircraft ,
   helicopters , Harrier , F-35B , and military aircraft.

3. OPERATION
The following scenario is used to describe the operation .

Your aircraft is lined up on a paved runway that has a painted runway centerline .

*** Left Click the "MK" button at top left.
This will (1) capture the Mark Position , and (2) switch on the display.
The Mark position is the aircraft's current location , it captures the current :-
1. Aircraft Latitude/Longitude position.
2. Aircraft Heading.
3. Ground elevation below the aircraft.

***From this data the instrument calculates and displays :-
1. Aircraft's "Current heading".
2. "Mark Heading" as both Grey text and hollow arrow.
3. "Bearing" as both Orange text and arrow.
   Importantly the above data is displayed over a green crosshairs.
4. "Distance" .
   Distance and Bearing are from the aircraft to the Mark Position.
5. "GS" the Glideslope angle from aircraft to Mark Position.
6. "G Elev" the ground elevation at Mark position.
7. "S-Ht" aircraft's height above the Mark Position surface.
8. Circuit width or Offset from Extended Centerline.

4. INTERPRETATION
The display can be interpreted as follows :-
1. The "Mark position" can be considered as a touchdown zone on a runway.
2. The "Mark Heading" can be considered as a runway centerline heading.
The "Mark Heading" effectively becomes a continuous axis line that permanently runs both forward and behind the "Mark Position" , with the forward portion
immediately in front of the "Mark Position" considered as your runway.
3. Whenever both the "Bearing" and "Mark Heading" arrows are aligned and superimposed over each other you are precisely on the "Extended Centerline".

"TO" condition:
** If both arrows are pointed in the same direction and aligned you are on the
"Extended Centerline" and flying towards the "Mark Position" and naturally towards your 'generated' runway (IE; on approach).

"FROM" condition:
** If both arrows are in an opposed direction but aligned you are on the
"Extended Centerline" and flying away from the "Mark Position"
(IE, this could be during Take Off).

** If the Hollow Arrow (Mark Heading) is exactly overlaid on the horizontal arm of
the background crosshairs you are on the Crosswind or Base leg of a circuit.
** If the Hollow Arrow is pointing down and exactly overlaid on the lower arm of the
crosshairs then you are on the downwind leg of a circuit.

  By using the lower Multiplex digit generator and then entering at the "GS" button
a Glideslope value of 3.00 degrees then by clicking at the ILS button the
 ILS approach guidance bars will appear , they are the normal "Command"
configuration of " Fly Up or Down" and "Fly Left or Right" to center both of the bars over the background crosshairs .

  Late downwind or base leg monitor your Glideslope angle when it reaches
3.00 degrees commence your descent and ensure that either the glideslope value
remains at 3.00 degrees *or the ILS GS bar remains centered till landing touchdown*.

Also on base leg monitor the "Bearing" text value as it approaches the
"Mark Heading" value anticipate and conduct a turn onto the final leg , both values should
now remain exactly the same till touchdown , *alternately fly the
lateral ILS bar keeping it centered on final*.

This procedure will automatically compensate for any crosswind all the way to touchdown.
Note that when accurately aligned on final both "Bearing" and "Mark Heading"
values are exactly the same , the difference between their values and the current aircraft
heading value is the WCA (Wind Correction Angle) .

While the above should be initially tried and flown at a paved airport to provide visual clues
to the processes involved and to acquaint the pilot with the instrument , it is not restricted to
airports.
The same procedure can be applied anywhere , roads , paddocks , rivers , lakes and at
sea , it enables you to find your "generated runway" then repeatedly conduct a precision
approach and landing at the same spot or Mark position.

5. MEMORY BUTTONS
There are three memory buttons , "Mem1" , "Mem2" and "ORIG" .
Note that "ORIG" has a dual function , discussed later at "Double ended Runway".

A "Mark Position" is created as often as desired at the "MK" button.
A location can be "stored" by simply "Right" clicking any of the three memory buttons , this
leaves the "MK" free to nominate other new locations.
To later on retrieve a location from the memory simply "Left" click that button , and
the location will be recalled and displayed.

6. DOUBLE ENDED RUNWAY
Firstly some very basic , but important assumptions.
A Runway consists of :-

1. A runway centerline.
2. Two runway headings , one at each end (reciprocal headings).
3. A runway total length , however the distance (length) between the touchdown zones at
each end is less than the total length.
It is the length between both touchdown zones that we are primarily interested in
for this instruments purposes.

How long should your runway be ?
It should be long enough for the aircraft that you are flying to land in , plus a small
margin added for safety.
A Piper Warrior GA aircraft about 2,000' .
A B-1 heavy bomber about 6,000'
For this instrument the pilot will have to make an " ESTIMATE " of the runway
length applicable based on aircraft type , and possibly by the size of a paddock that
might be used as a runway.

The pilot must arrive at a runway length for " entry " purposes that follow.

*Note :
Tape Measure - the available runway length of a paddock or other area can be measured.
Click the Mk button , then taxi (or fly) forward taking note of the "Distance readout" ,
using this method it is possible to determine runway length up to about 9,500' .*

*Use of a narrow roadway as a "Generated Runway" requires an accurate aircraft heading
at the moment of Mk Position capture (click) . To aid precision aircraft alignment hit the
"Alt" on the keyboard , then in top menu bar , click 'views' , then 'Axis indicator,
select either , 4 dots , or small v , or large v , then carefully align on the roadway , and
click the Mk Position button , that will ensure your ILS approach is precise.*

7. PROCEDURE
At the right side of the instrument you will see , FAR , RWY , ORG buttons.
They enable a 'generated runway' to be created and stored to memory.

STEPS
1. Generate your runway length in the Multiplex digit generator , say 6,425' ,
click the "Rwy" runway button , your runway length has now been entered and is visible next to the button .
2. To create the "ORIG" end of the runway , which will be your current location , very carefully and precisely set or point the aircraft to the heading that you desire the runway to have .
"left" click the "MK" button to get a "Location" .
The "MK" button can be clicked either when on the surface or airborne when flying.

Having entered this location.
  NOW , "Right"   click the "ORG" button , you will see the
" Heading " appear next to that button.
The "ORIG" Original End of the runway has now been stored in that button.

You have already stored the runway length and that is showing next to its button.

3. **NOW** , "Right"   click the "FAR" Far End button .
You have now created the Far End runway , and stored it at that button.

With both runway ends stored to memory the "MK" button is freed up to be used as often as desired .

To recall or retrieve either end of the runway , just   "Left" click the appropriate
button , each has the " Heading " (or runway heading) labelled next to it.

You are now able to conduct ILS precision approach and landings at either end of the runway simply by recalling (Left Click) the end that you wish to use.

WARNING : be very careful about LEFT and RIGHT clicks , it is easy to get it confused ,
care must be exercised in that regard .
   RIGHT click = Store to memory.
   LEFT   click = Retrieve from memory.

8. RETURN TO BASE OR DIVE BOMBING
The lower left (forth) button allows the "Mark Heading to be altered.
If at a distance from the "Mark position" you wish to return directly , turn till the "Bearing" is on the nose , enter the "Bearing" value into the "Mk Hdg" button ,
and you will have ILS bar guidance .
Similar applies to Dive Bombing , just add the Dive angle that you require into the
"GS" button, and enter the Bearing value into the "Mk Hdg" button , you will have a Run In heading , and Dive angle , and you will then have ILS bar guidance to target.

9. ILS TOLERANCES
Glideslope (Vertical) :
***FINE white bar +/- 0.7 degrees (1.4 degrees peg to peg)
  COARSE short orange bar +/- 3.0 degrees.
LOC (Lateral)
***FINE white bar +/- 2.5 degrees (5.0 degrees peg to peg)
  COARSE top-bottom orange bars +/- 10.0 degrees.
  COARSE short orange bar +/- 30.0 degrees.
These tolerances are exactly the same as those used in real world ILS units.