



ISAN - Integrated System for Autonomous Navigation

An open-source YOLOL project made by **Collective** for the Starbase Community

Document author : <D:\Solonerus>, <C:\Azurethi>, <C:\Zaff>
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<< PUBLIC RELEASE >>



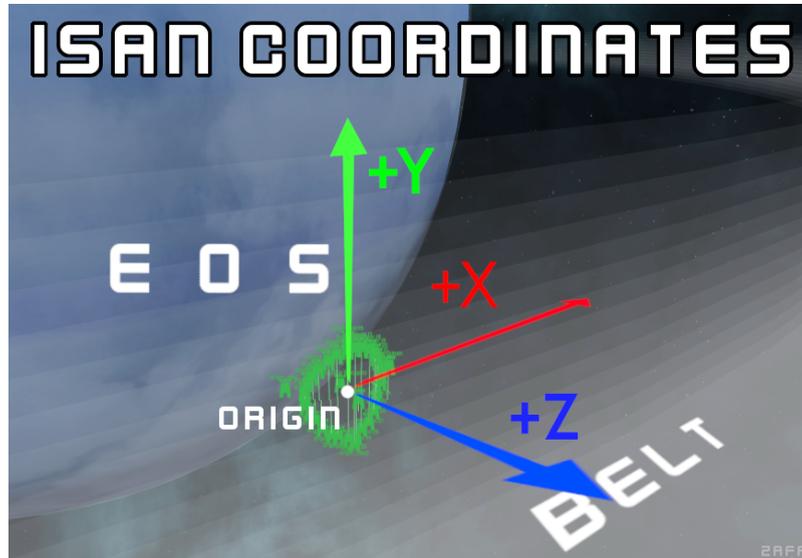
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>> Introduction

ISAN is a navigation system within [Starbase](#), developed by [Collective](#). It calculates your **X, Y, and Z coordinates in space**, relative to the center of the 'Origin Ringle':



Positive axis	Orientation	Towards beacon
+X	Sideways, across the belt. "Right" if looking at planet Eos from Origin spawn.	origin_east
+Y	"Up" from Origin. The same hemisphere that the sun orbits.	origin_north
+Z	Into the belt, away from planet Eos.	

Limits:

- ISAN has a maximum range of 900-1000 km, depending on direction.
- ISAN gradually loses accuracy when approaching max range.
- In ship workshop / test flight, the Z and Y will switch places.
 - This lines up X & Z with the ssc axes, while Y will be -Y

From everyone here at **Collective R&D**, particularly the **ISAN development team**, we **hope you enjoy ISAN!** You can be notified new ISAN updates by subscribing to "ISAN Updates" in the **#notifications** channel of the [Collective Discord](#). There you will also find the channel **#isan_tech_support**. Though we recommend you first try to read over this document when you encounter new issues with ISAN.



[ISAN v2 Introduction video](#) (by Kenetor).



>> The modes

ISAN has two modes; **Mono** and **Quad**

- **ISAN Mono** only requires [1 receiver](#) but is **less accurate** while moving.
- **ISAN Quad** requires [4 receivers](#) to retain **good accuracy** while moving.
 - *In case of receiver damage, **Quad** will try to switch back into **Mono**.*

	Mono (M)	Quad (Q)
Accuracy while moving	±100m	±50m
Accuracy while stationary	±1m	±5m
Required Nav Receivers	1	4
Required YOLOL chip	1 Basic or Advanced*	
Max range from Origin	900-1000 km	
Refresh rate**	0.6 seconds	
* Basic chip grants position . You'll need an advanced chip to also display speed . ** Refresh rate is increased by 0.2 seconds when enabling speed or prediction .		

⚠ [Changes to your ISAN setup apply after you [Reboot](#).]



>> Installing ISAN Mono

 [30 seconds tutorial](#)

 **Hardware requirements:**

0. A **power source**.
1. A **small navigation receiver**. Place it anywhere on your ship. Orientation does not matter. Ensure it's bolted to a **hardpoint** with cable connection.
2. A **yolol chip** inside a **yolol chip socket / chip reader**:
 - **Basic** chip if you only want to see position.
 - **Advanced** chip if you also want to see ship speed.
 Ensure cable connection to the socket/reader.
3. A visible **text panel**. Ensure the text panel has connection to a panel base.



ISAN Mono Setup

You will need to edit data fields.

- If in-**world**: Press U to open Universal tool then go to the data tab.
- If in the **Spaceship Designer**: Select object and watch the properties window.

4. Open the **receiver**. Rename
 - **SignalStrength** to **A** and
 - **TargetMessage** to **AT**.
 If you cannot see any of this, press the >.
5. Set the **value** of **ListenAngle** to **180**.

NAME	VALUE
Message	0
A	0
ListenAngle	180
AT	0
TargetFrequency	1
Frequency	0

Properties - Small Navigation Receiver ✖

< 2/2 >

6. Open the **text panel**. Rename **PanelValue** to **_** (underscore)

NAME	VALUE
_	0

7. Copy and paste the newest [ISAN code](#) into the chip.
8. ISAN should now work. If it doesn't, try [Reboot](#) or see [ISAN Errors](#). Enjoy!

```

14 | x=:_ :_ =up+"\nReceiverCs) damaged." goto 14-14*(x=="")
15 | i+=ar b+=br c+=cr d+=dr // ISAN v2 Documentation: isan.to/doc
16 | xx=i/e+b/j+c/k+d/l/y=i/t+b/n+c/o+d/pp zz=i/h+b/r+c/s+d/tt uu=u*ds
17 | xy=:_ ="" :_ =mm+xx/RiMu+my+yj/RiMu+mz+zz/RiMu+ms+ss gotosv+uu+v*xy
18 | l+=xx ay+=yy az+=zz x=l-px y=ay-py q=az-m sv+=Cii+*%3)1 gotou
19 | ss=Cx*xx+y*yy+q*qj^sq/[p-3*vv) px=1 py=ay m=az l=0 ay=0 az=0 sv=18 gotou
20 | xy=:_ :_ =up+"\n\n Streamer\n Mode" goto 20-20*(xy=="")
  
```

```

_: POS :_
M
X: 38387
Y: 41493
Z: 4683
  
```



>> Installing ISAN Quad

 [We recommend that you understand [ISAN Mono](#) before installing ISAN Quad.]

 [30 seconds tutorial](#)

 *Hardware requirements:*

0. A **power source**.
1. Four **small navigation receivers**. Group them as **close together as possible** anywhere on your ship. Orientation does not matter. Ensure they're all bolted to **hardpoints** with cable connection.
2. A **yolol chip** inside a **yolol chip socket / chip reader**:
 - **Basic** chip if you only want to see position.
 - **Advanced** chip if you also want to see ship speed.
 Ensure cable connection to the socket/reader.
3. A visible **text panel**. Ensure the text panel has connection to a panel base.



ISAN Quad setup:

We will now refer to the four receivers as **A, B, C, D**. Order doesn't matter.

4. With **X** being a placeholder for the receiver letter; rename **SignalStrength** to **X** and **TargetMessage** to **XT** in all 4 receivers:

Message	0	Message	0
A	0	B	0
ListenAngle	180	ListenAngle	180
AT	0	BT	0
Message	0	Message	0
C	0	D	0
ListenAngle	180	ListenAngle	180
CT	0	DT	0

5. Set the **value** of **ListenAngle** in **all four receivers** to **180**.
6. Open the **text panel**. Rename **PanelValue** to **_** (underscore).

NAME	VALUE
_	0

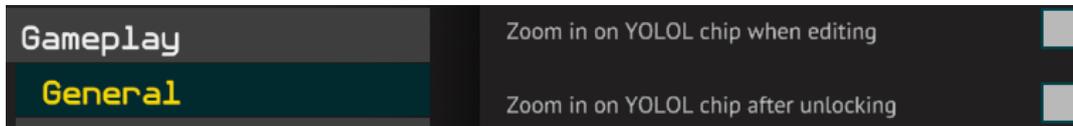
7. Copy and paste the **newest ISAN code** into the chip.
8. ISAN should now work. Since you installed Quad, it **should also show "Q"**. If you see M (Mono) that means B, C or D is incorrect. [Reboot](#) if you encounter issues. Enjoy ISAN!

:	POS	:
	Q	
X:	38384	
Y:	41493	
Z:	4683	



>> ISAN YOLOL code

We recommend enabling “Zoom in on YOLOL” in Starbase settings.



The newest code will be linked here at isan.to/doc

[Newest ISAN 2.5 Code](#) (Basic package)

1. Open the code above and a YOLOL chip by dragging down on the .
2. Copy and paste (ctrl+C, ctrl+V) line **1-20** into the YOLOL chip.
3. *Optional:*
*If using an **advanced chip**, you can see **ship speed** (costing 0.2s)
To enable, edit line 1 by setting **sp=1***
4. *Optional:*
*If using **ISAN Mono**, you can enable **prediction** to increase **linear** accuracy (costing 0.2s). To enable, edit line 1 by setting **pr=1**.*
 *[This does not work on Quad!]*
5. Exit the YOLOL chip by pressing escape.
6. If the code doesn't run as expected, try [reboot](#) or copy again.

Other links

 [Version History](#) at README of basic package..

 [Raw text](#)

 [Feature list](#) (some WIP)

 [ISAN Math explained](#)

 [Main Developer](#)

 [Contribute to ISAN](#)



>> ISAN Errors

Text on screen	Cause
Loss of Signal	Any of the radio receivers are not picking up a signal from the stations ISAN relies on. This will show when leaving ISAN range (900-1000km).
Receiver(s) Damaged	The "A" receiver is damaged or inaccessible. If ISAN Quad takes damage in other receivers, this message will be displayed until ISAN switches to Mono.
Streamer Mode (Unable to exit)	ISAN will default to Streamer Mode if the code has been copied incorrectly or if you're trying to use incompatible features like Speed on a basic chip. You will be unable to exit Streamer Mode until this has been corrected.
_: 0	The text panel is not connected to the ISAN chip.

Other possible reasons ISAN doesn't work:

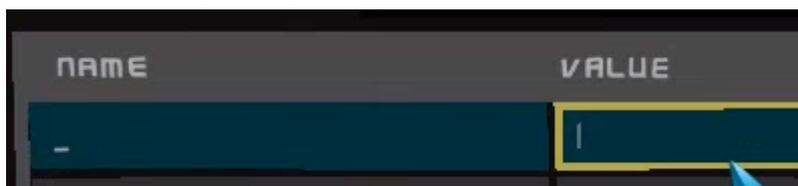
- You've copied the code incorrectly. Recheck that the first and last letter of each line is the same as on isan.to/doc/code or copy it again.
- You've accidentally clicked into the chip code and added stray characters. Copy it again, careful not to hit other keys.
- You've confused **value** and **name**. Ensure receiver(s) and text panel matches those in the installation instructions.
- Other YOLOL chips may interfere with the receiver fields.

>> Streamer Mode / Reboot

"Have you tried turning it off and on again?" - ISAN Tech Support

ISAN comes equipped with a **streamer mode** to hide your coordinates. It doubles as the way to **reboot** the system.

- To **toggle** streamer mode: Press **U** on the text panel and delete the entire **value** including the quotes (""). You can use Ctrl+A to do it faster.



- When toggling back, ISAN will reboot. Try doing this first if you encounter any issue or have changed settings.



>> Modules

 [**Ignore** this section if using “standard ISAN”.
This is **only** necessary if using **external modules**.]

Modules are a way for users to expand upon ISAN’s functionality. The ISAN Team is working on making the v1 modules compatible with v2. Until then, feel free to develop your own.

ISAN by default requires **no external memory fields except for the direct ‘_’ text panel**. If you wish to enable external modules:

- On YOLOL lines **14, 15 & 16**, replace the first character of the variables ‘**XX**’, ‘**YY**’ & ‘**ZZ**’ with a ‘**’**’
 - Install a **memory chip** containing the ‘**X**’, ‘**Y**’ and ‘**Z**’ fields.
-



>> FAQ

Question	Answer
I installed ISAN and it won't work. Why?	Double-check tutorial steps, ISAN errors , data field names, code equality, Reboot ISAN . Otherwise get help from a friend or someone at Collective's #isan_tech_support channel.
I bought a ship with ISAN and it won't work. Why?	It's likely using old, outdated ISAN v1 code. You can upgrade to ISAN v2 using this doc. Note that any ISAN information or ships last updated before August 2021 is v1, not v2.
Can I sell ISAN ships or chips? (Using ingame Starbase credits of course)	Yes. ISAN is free and open-source .
Why "ISAN"?	I ntegrated S ystem for A utonomous N avigation. Catchy acronym. Pronounced "Eye-Sand" without 'd'. The name applies to Collective's collection of navigation tools.
How does ISAN work?	Multilateration of 4 station transmitters.
Why is Quad more accurate than Mono?	Q receives all 4 transmissions at once, while Mono cycles through each, taking samples from different locations when moving.
Why the 900-1000km range? (<i>"the ISAN bubble"</i>)	ISAN requires connection with all 4 beacons near Origin, each with 1000km range.
Can ISAN be used to track me?	No. Receivers are one-way. There have been scam attempts saying otherwise, so beware.
What is the ISAN.to Starmap?	An ISAN-compatible Starbase map developed by Collective (strikeeaglechase).
Can ISAN.to be used to track me?	Not unless you share position to a public layer. Starmap, like most web services, requires logging of certain information for analytics, debugging and preventing abuse.
Is ISAN licenced?	Yes, ISAN is licenced under GNU public licence v3 . (<i>Only applies to our GitHub</i>)



>> Credits & Commentary

ISAN began as a small project I made public on a whim, but has grown to be a main-stay of many Starbase ships. I've encountered hundreds of people on this journey, ranging from interested YOLOL developers to faction representatives, each a brighter spark than the last. It's a rollercoaster, but one I plan on staying on. Thank you reader for using ISAN, your kind words, support and exaltation have been a bright 'lighthouse' in the darkness.

- *Solon, Kernel of Collective R&D and ISAN Project Leader*

Current v2 Version:

- **Solon** - Project Leader
- **Azurethi** - Lead Developer, math wizard
- **Zaff** - Installation guide (this document)
- **CYLON members** - YOLOL debugging assistance

Previous Versions:

- **Solon** - Development of ISAN v0
- **Lumi Virtual** - Development of ISAN v1
- **Strikeeaglechase** - Development of offsets and ISAN code, ISAN Starmap
- **MuNk** - Code consultation
- **Nordwolf** - Development of ISAN 0.5
- **Battle_Wrath** - Various design ideas and general help
- **Archduke** - Invaluable support and document writeup
- **Zaff** - Usability consultation, document.
- **Meboy100** - Le rubber duck (test subject)