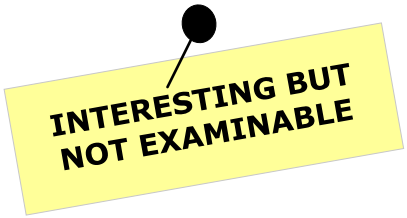
IFR and ATPL Briefing Note:
Standard Terminal Arrivals (STARs)

Standard Terminal Arrivals (STAR) have been around for a while and have grown in importance with the integration of GPS into our air-navigation system.

STARs provide arriving aircraft with a transition from enroute structures, such as airways or air routes, to terminal environments where they end at a waypoint or navaid that is common to an instrument approach procedure or allows radar vectors to an instrument approach procedure.

Simply put, a STAR is a series of route segments starting from a waypoint in the enroute structure, that lead to a location (waypoint) where you can transition to an approach. This ending waypoint is either a location from which you can receive RADAR vectors to an approach, known as a Downwind Termination Waypoint (DTW) or it could be an "Interface Waypoint" that is common to both the STAR and the approach so that you can directly continue onto the approach procedure.



STARs make everyone's life easier:

- **They organize the flow of arriving traffic** into predictable paths and altitudes that eases ATC's management workload

- **They enable reduced radio frequency congestion** by eliminating the provision of a potentially long and/or complex clearance from ATC and an equally long and/or complex readback of a clearance from ATC.

- **They reduce the opportunity for miscommunication between ATC and the pilot/s** which is all too common despite the requirement for clearances to be read back.

- Some of them **allow for separation of traffic by type of aeroplane** – for example jet and non-jet (propeller driven) aeroplanes can be separated. This again provides for ease of management along enhanced safety

- **They allow for advance review preparation by the pilot** which greatly reduces the chances of miscommunication and errors in the cockpit.

- Their use has been shown to result in **greater predictability and consistency of compliance in the following of the desired flight path** which enables more reliable spacing and hence greater safety

Open and Closed STARS

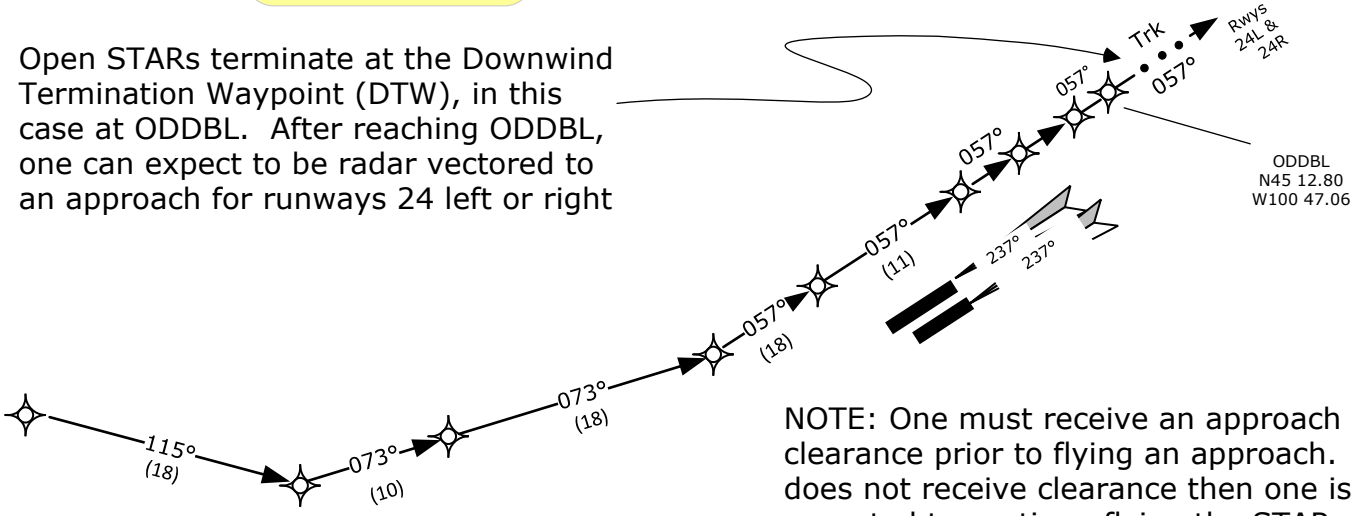
KNOW THIS

A STAR is either open or closed. Both provide a continuous path from the enroute structure. The difference is that a closed STAR joins up with the final approach course while an open STAR does not.

When flying an open STAR one can expect the STAR to place one on the downwind position and that radar vectors will be provided to the final approach course.

Open STAR

Open STARs terminate at the Downwind Termination Waypoint (DTW), in this case at ODDBL. After reaching ODDBL, one can expect to be radar vectored to an approach for runways 24 left or right

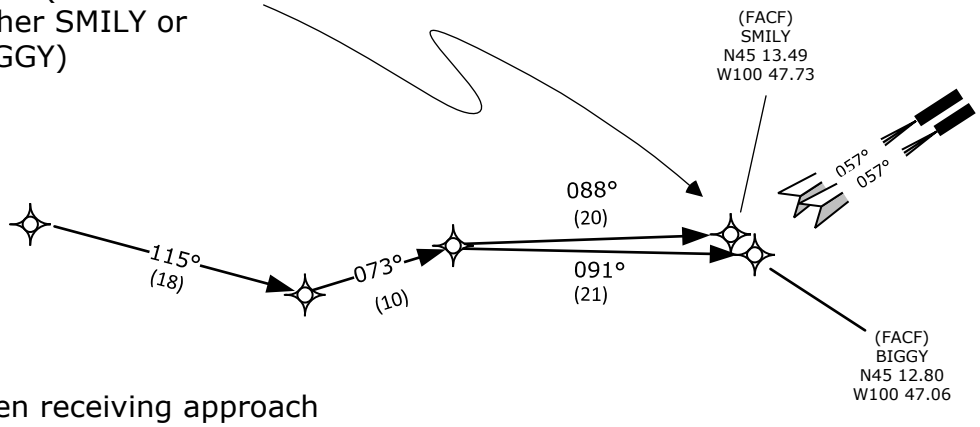


NOTE: One must receive an approach clearance prior to flying an approach. If one does not receive clearance then one is expected to continue flying the STAR procedure while awaiting further clearance.

Closed STAR

A closed STAR is normally available when the final leg of the STAR is within ±90° of the final approach course to the runway.

A closed STAR terminates at the FACF (in this case either SMILY or BIGGY)



When receiving approach clearance one is required to continue flying the STAR (adhering to all published altitude and speed restrictions) to the FACF, intercept the final approach course and fly the straight in approach.

NOTE: If one reaches the end of a STAR prior to receiving an approach clearance then one is expected to intercept the final approach course and fly inbound maintaining the last assigned altitude. If one does not receive further clearance prior to reaching the end of the final approach course then one flies the missed approach maintaining the higher or the last cleared altitude or the missed approach altitude.

Basic structure of a STAR

Standard Terminal Arrivals are made up of 3 or 4 basic segments:

1. The **beginning or initial segment.** A STAR may have multiple feeder routes coming in from different directions. These feeder routes are known as transitions. One can think of these as the roots of a tree feeding into the trunk.

2. The **common waypoint** where the feeder routes all meet. Think of this as the point where all the roots of a tree come together.

3. From the common waypoint there will often (but not always) be a **common route** that all traffic flying the STAR follows towards an airport. Continuing the tree analogy, one can think of this as the trunk of the tree.

4. The **ending** where the arrival either blends with an approach or terminates and is followed by radar vectors to an approach. If an airport has multiple runways then the ending will include a split to the different runways or opposite ends of a runway. This can be thought of as the branches of a tree splitting out from the trunk.

There are two types of STAR (AIM 9.2.3.2)

A **conventional STAR** which can be flown using ground-based navigation aids such as VORs, DMEs and NDBs. A conventional STAR usually ends with ATC providing radar vectors.

Performance Based Navigation Standard Terminal Arrivals (PBN STARs). PBN STARs require area navigation equipment and a flight management system in order to be flown.

NOTE:
Conventional STARS are being phased out in Canada

KNOW THIS:
A conventional STAR is labled simply as STAR . A PBN STAR is titled "STAR (RNAV)"

Required onboard navigation equipment to fly a STAR

Where a navigation specification has not been assigned to a PBN STAR the on-board FMS or RNAV system must meet 5 basic criteria

Meet Certification	• Must meet AC20-130 (or later approved), OR • Must meet AC20-138 (or later approved) and TSO C120a
Current Database	• Must contain waypoints for the STAR to be flown • Must be automatically loaded into system flight plan
Electronic Map Display	• Any system must include an electronic map display
Flight Path Following Ability	• Must be able to follow the system flight path • Must be able to limit the cross-track error deviation to ±½ of accuracy required for the procedure or route
If GPS sensor is not used	• If system is not referenced to GPS then it must include at least one automatic radio-updated IRU

What happens if you are unable to meet the navigation specification for a STAR or if do not have the equipment listed above?

1. File a flight plan that includes waypoints from the expected STAR procedure that are as close to the waypoints as possible.

2. Include the remark in field 18 of the flight plan: RMK/NO RNAV STAR

Naming and Revision Numbering of STARS

The identification of a procedure on a chart consists of the procedure type, the plain language designator and the coded designator

The plain language designator is the spoken identification for the STAR procedure and is in-turn made up of 3 parts: the basic indicator, a validity number and the term ARR.

All arrivals have validity number 1 to 9. When an arrival is first created it has the number 1. When the validity number is nine and an update is created then it changes back to 1. Arrivals are revised relatively infrequently so it is probably a decade or more before the validity number reaches 9 so there is no chance that a current arrival can be confused with an older version.

If a STAR include transition routes then one uses a primary procedure identification in combination with the appropriate enroute transition identification to fully identify the STAR.

Refering to the chart on the next page for example, when flying the FUNDY FIVE arrival into Halfax (CYHZ), the specific arrival that one would fly is the FUNDY FIVE arrival with either the EBONY transition or the ALLEX transition again depending on the direction from which one is approaching the Halifax airport.

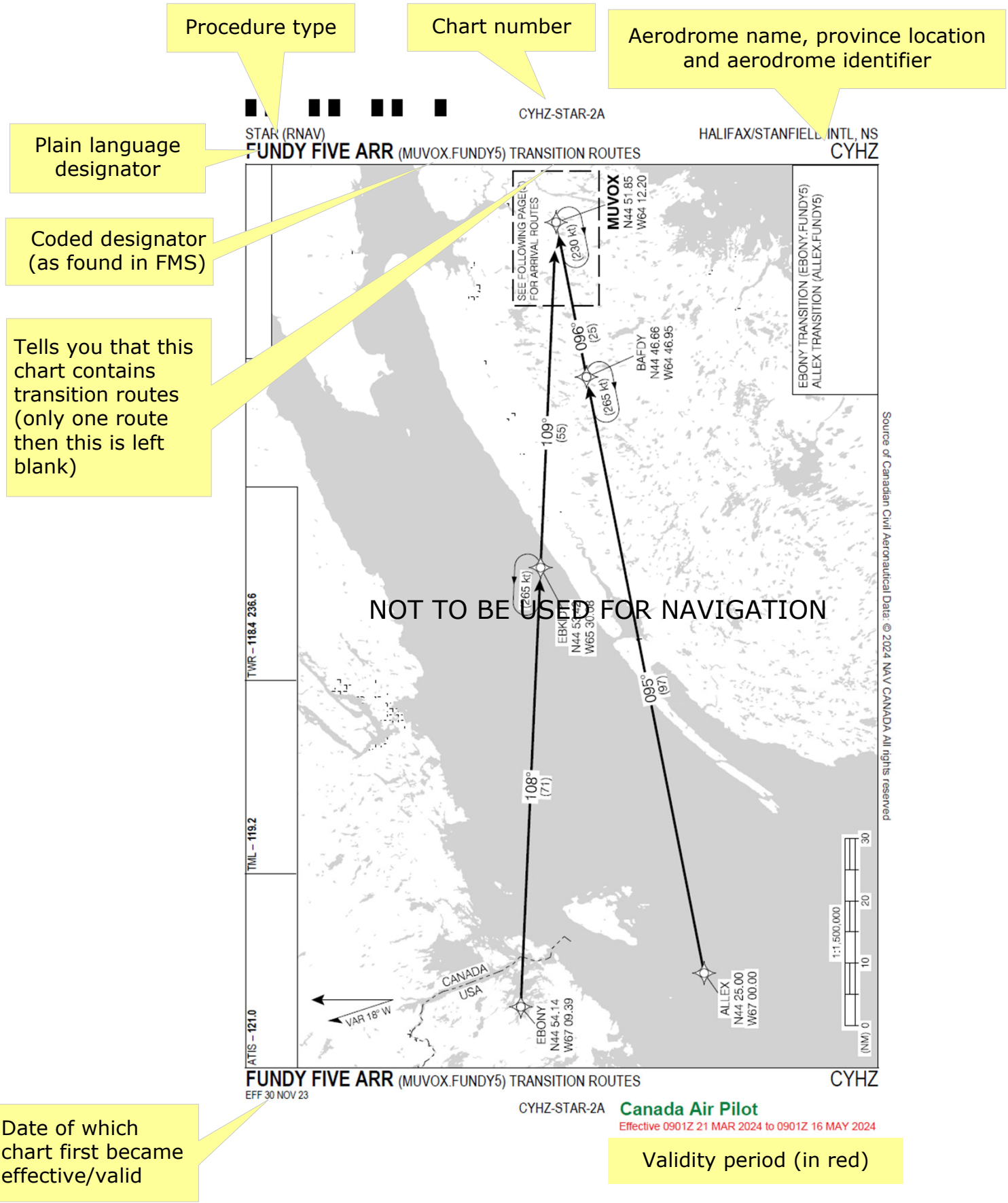
Similarly, when flying the APASS SEVEN arrival into Victoria (CYYJ), the specific arrival that one would fly is the APASS SEVEN arrival with either the KEINN transition or the BOOTH transition depending on the direction from which one is approaching the Victoria airport.

If a transition is not specified then it means that there is only one transition route assosiated with the STAR.

If a STAR name is followed by "(TRUE)" then it is in Northern Domestic Airspace (NDA). Tracks on STARs in Northern Domestic Airspace are TRUE tracks.

If a STAR name is followed by "(DND)" then it is designed and maintained by the Department of National Defence. This does not prevent civilian pilots from flying it.

Anatomy of a STAR – information around the periphery



Anatomy of a STAR – communication block, Performance Based Navigation requirements box and

This symbol indicates that service / communications are not available 24 hours per day. You should consult the CFS for hours when it is available.

ATIS / AWOS FREQUENCY	ARRIVAL AREA FREQUENCY	TOWER FREQUENCY

Available appropriate radio frequencies and available hours in order of expected use

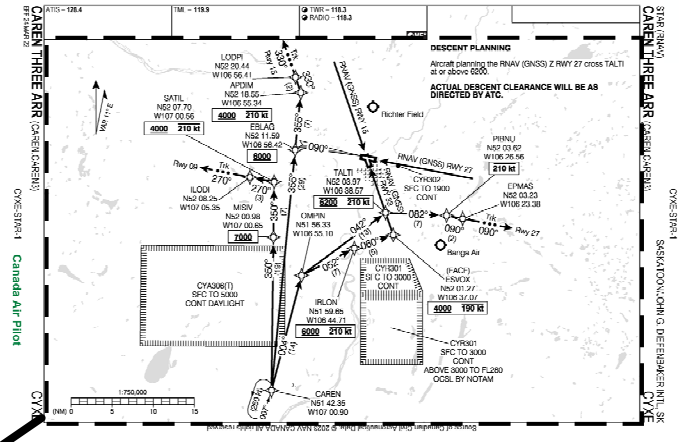
Performance Based Navigation (PBN) requirements box.

If this box is blank then the on-board FMS or RNAV system must meet 5 basic criteria including certification, database currency, having an electronic map display, flight path following ability and an IRS if no GPS is installed.

List of transitions (if there is only one transition then this is left blank)

Anatomy of a STAR – plan view

The plan view is drawn to scale showing runways, navaids (conventional STAR only), restricted areas, danger areas, tracks, altitude and speed restrictions.



Fly-by waypoint

Magnetic variation in area of chart

CHART SCALE

Route segment magnetic track

NOT TO BE USED FOR NAVIGATION

Segment length

Initial approach waypoint (IAWP)

Basic rules and procedures when flying STARs

Lateral track following – one must follow the charted lateral track in a STAR when:

- A flight plan has been filed that includes a STAR or
- When one receives and acknowledges a clearance that includes a STAR

Basic rules and procedures when flying STARs

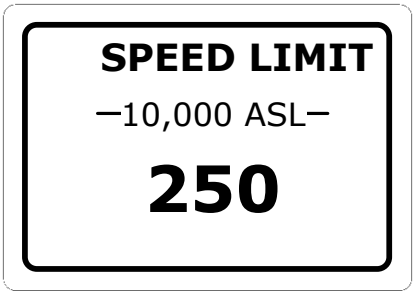
Speed restrictions – one must fly charted speed restrictions on a STAR except when ATC assigns a different speed restriction. STAR speed restrictions are indicated as shown to the right.

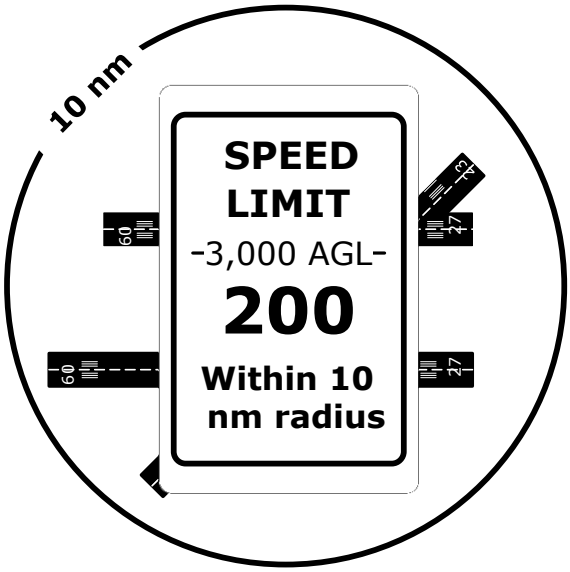
Any ATC assigned speed restriction must be followed until CAR 602.32 prohibits a pilot from flying at the assigned speed. Holding speeds also apply as per AIM RAC 10.7.

STARS Speed Restriction Indicators

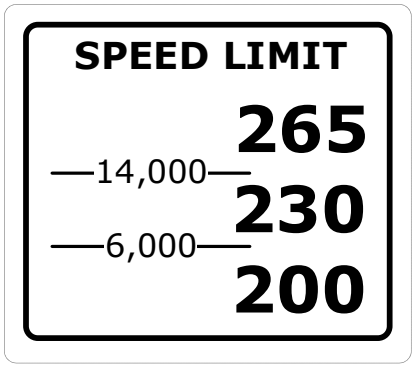
YYYkt	Maximum IAS restriction
YYYkt	Minimum IAS restriction
YYYkt	Recommended IAS
YYYkt	Mandatory IAS

General Speed Restrictions (CAR 602.32)





Holding Speed Restrictions (AIM RAC 10.7)



ALWAYS REMEMBER:

If your minimum safe speed is greater than the speeds posted, either in a STAR or per the CARs then you should fly at the minimum safe speed and notify ATC

Altitude restrictions – although one is expected to follow the charted lateral track of a cleared STAR without further ATC clearance this is not the case with the vertical profile of the STAR ATC has to specifically issue descent clearance. When ATC issues descent clearance one is required to descend on the STAR vertical profile to the ATC assigned altitude.

VERY IMPORTANT

Unless specifically cancelled by ATC, all charted restrictions above the ATC assigned altitude on the STAR remain mandatory.

REMEMBER THESE Altitude restriction indicators

XXXX	Maximum altitude restriction
XXXX	Minimum altitude restriction
XXXX	Mandatory altitude restriction

Normally one would request a STAR when filing one's flight plan or one might be assigned by ATC.

You do not have to accept an ATC clearance for a STAR – remember that you are PIC. If you are unable comply with the STAR (for example, if your aeroplane does not have the required performance capability) you should advise ATC.

You also may not accept a STAR if you do not have the charts for the STAR on board or your FMS database is not current.

You may also not accept a conventional STAR if all of the necessary ground based navigational aids are not functioning