

Flight Test Brevity

A Communications Guide

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Table of contents

Preface	6
Purpose	6
Feedback	6
Change Log	6
1 Introduction	8
1.1 Brevity codes	8
1.2 Flight Test Brevity	8
1.3 Method	9
2 The Principles of Brevity	10
2.1 Principle 1 - Contracts	10
2.2 Principle 2 - Only Three Types of Brevity Code	11
2.3 Principle 3 - Standard Word Count	11
References	12
Appendices	12
A Flight Test Brevity Codes	13
A.1 RADIO CHECK	14
A.2 READY	15
A.3 CLEARED	16
A.4 STEP	17
A.5 CONCUR	18
A.6 "CONFIRM	19
A.7 CONTINUE	20
A.8 AFFIRM	21
A.9 NEGATIVE	22
A.10 ACKNOWLEDGE	23
A.11 WHEN ABLE	24
A.12 STANDBY	25
A.13 HOLD	26
A.14	27
A.15 INCREASE/DECREASE	28

A.16 CEASE	29
A.17 TERMINATE/ABORT/KNOCK-IT-OFF	30
A.18 COMPLETE	32
A.19 NEXT	34
A.20 CLEAN AND DRY	35
A.21 Codes NOT to use	36
B Multiservice Codes Applicable to Flight Test	37
B.1 Symbol Keys	37
B.2 Attention-Getting Codes	38
B.3 Informative Geometry Codes	41
B.4 Relative Geometry Codes	42
B.5 Picture Geometry Codes	44
B.6 Single-Ship Maneuver Codes	49
B.7 Request Codes	51
B.8 Weapon Codes	52
B.9 Sensor Codes	55
B.10 Avionics/Datalink Codes	58
B.11 Clearance Codes	60
B.12 Flight Condition Codes	64
B.13 Rules of Engagement & Identification Codes	64
C Unsafe Communication	67
C.1 4 ways control actions can be unsafe	67
C.2 Translated to flight test communications	68
D Test Point Flow	70
D.1 The problem	70
D.2 A Test Point	70
D.3 Procedure	71
D.4 Setup	71
D.5 Recovery	72
D.6 Admin	72
D.7 Transitions	72
D.8 The structure approach	73
D.9 Application to test card creation	73
D.10 Application to Comm Plan	73
E Communications Plan	77
E.1 Brevity...a small part of the comm plan	77
E.2 Creating a comm plan	77
E.3 Using the comm plan:	79

List of Figures

B.1	The Relation Between Aspect Angles and Relative Geometry Brevity Codes . .	48
D.1	Structured Approach to Test Point Flow	70
D.2	A Quantum of Test	71
D.3	Where The Data Live	71
D.4	Preparation for Test	71
D.5	Return to Normal Operations	72
D.6	A Change of State	72
D.7	“Pause” Points	73
D.8	Top to Bottom Test Point Flow on Test Card	74
D.9	Multiple Test Points on a Single Test Card	75
D.10	Exit and Entry Criteria	75

List of Tables

1.1	Correlation Between Test Conduct Quality and Proper Communications	8
2.1	The Three Brevity Code Types	11
2.2	Word Count Form in Brevity Codes	11
B.1	Key to Multi-Service Brevity Codes	37
B.2	Attention-Getting Brevity Codes	38
B.3	Informative Geometry Brevity Codes	41
B.4	Relative Geometry Brevity Codes	42
B.5	“Picture” Geometry Brevity Codes	44
B.6	Single-Ship Maneuver Brevity Codes	49
B.7	Request Brevity Codes	51
B.8	Weapon Brevity Codes	52
B.9	Radar or Sensor Brevity Codes	55
B.10	Avionics or Datalink Brevity Codes	59
B.11	Clearance Brevity Codes	61
B.12	Flight Condition Brevity Codes	64
B.13	Rules of Engagement & ID Brevity Codes	64
E.1	Priority of Term Definitions	78

Preface

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Purpose

This guide is intended to accelerate the communications training of flight testers. The desired end state is a flight test team who can safely, securely, effectively, and efficiently communicate with each other, whether over the radio or face-to-face.

Feedback

This guide is a living document. All feedback is welcomed, and the most effective means of providing it is to create an “Issue” at <https://github.com/cooknl/flight-test-brevity/issues>

Change Log

- 2023-04-08 v1.2.0
 - Reorders appendices to have Flight Test Brevity Codes lead
 - Extensive re-alignment of Multi-Service Brevity Codes Applicable to Flight Test to conform with 2020 Change 1 version of BREVITY
- 2023-04-02 v1.1.0
 - Extends appendices
 - * Moves “Comm Plan” from body to appendix
 - * Adds “Test Point”
 - * Adds “Unsafe Comm”
 - Alters format of Flight Test Brevity Codes from tabular to paginated to improve pdf version

- Adds pdf version
- 2023-02-11 v.1.0.0
 - Port to Quarto
 - Update from 2002 to 2020 Change 1 version of BREVITY
 - * (FM 3-97.18/MCRP 3-25B/NTTP 6-02.1/AFTTP(I) 3-2.5 2002)
 - * (ATP 1-02.1/MCRP 3-30B.1/NTTP 6-02.1/AFTTP 3-2.5 2020)
 - Table [1.1](#) order changed
- 2016-08-04 Most recent Word version

1 Introduction

1.1 Brevity codes

“**Brevity codes**” are short, standard phrases used in operational radio communications to maximize information content while minimizing time spent transmitting (keying the microphone) and receiving (wondering what they just said).

For the United States armed forces, brevity codes are defined in the document *BREVITY* (ATP 1-02.1/MCRP 3-30B.1/NTTP 6-02.1/AFTTP 3-2.5 2020). The publicly releasable version of the document is used for this guide.

1.2 Flight Test Brevity

“**Flight Test Brevity**” takes the concept of brevity codes and extends it to test team communications (comm) that

1. uses the principles of brevity codes,
2. does not misuse official brevity codes, and
3. defines specific words to be used in a communications plan for a particular test mission.

Properly used, brevity can assist flight test conduct by encouraging proper communication. There is loose correlation between proper communications and test conduct quality, as shown in Table 1.1.

Table 1.1: Correlation Between Test Conduct Quality and Proper Communications

Test Conduct Quality	Proper Communication
Safe	Complete
Secure	Concise
Effective	Correct
Efficient	Clear

1.3 Method

To reduce the confusion of misused brevity and to leverage military rated aircrews' operational training, this guide introduces **brevity codes** in their military context, the multiservice document *BREVITY* (ATP 1-02.1/MCRP 3-30B.1/NTTP 6-02.1/AFTTP 3-2.5 2020). The multiservice brevity codes most applicable to flight test are shown in Appendix B, with the definition and the flight test context included.

This guide develops a general approach to **Flight Test Brevity** to enhance test conduct quality and inform test teams' communication plans. Appendix A contains Flight Test Brevity terms. Each entry states the term, and its definition. Typical errors associated with each term are also shown, as well as the effects of the error and a "plain English antidote" to be used if brevity breaks down.

2 The Principles of Brevity

BREVITY does not contain all of the words required for test conduct, but it is an important document for establishing the principles of brevity and for avoiding misuse of official terms.

- Section [2.1](#) Contracts
- Section [2.2](#) Types
- Section [2.3](#) Word Count

2.1 Principle 1 - Contracts

One of the strengths of brevity is the coupling of a code with pre-arranged roles and responsibilities, or “contracts.” A given code, when broadcast, is always associated with a particular role, reducing the amount of time required for identifying the transmitter and intended receiver. A given code also updates or confirms the responsibilities of the transmitter and the receiver.

BREVITY EXAMPLE

TACO 02: “TACO 02 is IN RIGHT”

TACO 01: “PRESS”

PLAIN ENGLISH EXAMPLE

TACO 02: “TACO 01, TACO 02, I’m going to engage with the target that I had been previously assigned by making a sharp turn to the right, therefore I’ll no longer be able to stay visual with you, so you need to make sure you don’t run into me and keep scanning for other threats.”

TACO 01: “TACO 02, TACO 01, as Flight Lead, I’m directing you to continue your attack as stated in your transmission. I will continue to scan for other threats, while preventing your target from obtaining the advantage over you. I will also not run into you.”

In the above example, notice that the wingman, “Taco 02,” and flight lead, “Taco 01,” did not have to identify themselves, and used single-syllable words, “IN” and “PRESS,” to communicate current and future actions, as well as changes to responsibilities for separation and support.

2.2 Principle 2 - Only Three Types of Brevity Code

Brevity codes can be sorted by their intent, as shown in Table 2.1. This sorting is important, because it shows the three types of brevity code:

- direct
- inform
- request

Table 2.1: The Three Brevity Code Types

Type	Intent	Example
Direct	I am telling you to do something	“HOOK LEFT”
Inform	I am describing something to you	“WINCHESTER”
Request	I am requesting information AND you are expected to reply	“PICTURE”

The bottom line is this:

If you aren’t directing, informing or requesting, then you’re not using brevity, you’re having a discussion.

2.3 Principle 3 - Standard Word Count

Some brevity codes are standalone and some are always accompanied by other words, as shown in Table 2.2. This distinction is important, because it sets the expectation of how many words should constitute a radio call. If the number of words doesn’t match expectations, confusion may ensue.

Table 2.2: Word Count Form in Brevity Codes

Word Count Form	Examples
Standalone	“MADDOG” “LINE ABREAST”
Standard Additional Words	“CHECK (number, left/right)” “(system) BENT”

References

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A Flight Test Brevity Codes

This appendix consists of flight test brevity codes that resolve many of the most common test team communication issues.

Codes are presented in roughly chronological order of a typical flight test mission.

A.1 RADIO CHECK

Correct Usage

- “RADIO CHECK”
- “RADIO CHECK ON [channel]”

Meaning

- “RADIO CHECK”
 - I’m requesting that you tell me how well you can hear my transmission on the PRIMARY or MAIN channel.
- “RADIO CHECK ON [channel]”
 - I’m requesting that you tell me how well you can hear my transmission on the explicitly stated channel.

Typical Errors

1. Calling for a “RADIO CHECK” from a channel other than PRIMARY or MAIN.
2. Calling for a “RADIO CHECK ON [channel]” from a channel other than that explicitly stated

Effect of Errors

Aircrew think you’re calling on a channel that you’re not calling from, and provides a RADIO CHECK on that erroneous channel, leading to a “false positive” or “false negative.”

Plain English Antidote

“How do you hear me on [channel]?”

A.2 READY

Correct Usage

“[Transmitting callsign] IS READY [for taxi/departure/point X/etc]”

Meaning

The sender is ready to support test as soon as clearance is obtained for the next administrative step (taxi, takeoff, etc.), or as soon as the receiver acknowledges with “[Receiving callsign] IS READY”

Typical Error

1. “CLEARED TO [action for which the sender has no authority or responsibility such as TAXI, DEPARTURE, APPROACH, etc.]” 2. “...” (aka crickets)

Effects of Error

1. Receiver begins action without proper coordination and/or clearance.
2. Aircrew are wondering what’s going on.

Plain English Antidotes

1. “[Transmitting callsign] is showing all necessary steps complete and is prepared for [receiving callsign] to [take action]”
2. Say something/anything.

A.3 CLEARED

Correct Usage

1. “CLEARED TO MANEUVER”
2. “CLEARED [test point]”
3. “CLEARED [condition]”

Meaning

Initiate action per the brief for this context

Typical Errors

1. Saying “CLEARED TO MANEUVER” way too early, i.e. prior to setup, instead of clearing the aircrew to a setup flight condition to prepare for the actual maneuver. 2. Saying “CLEARED TO MANEUVER” way too late, i.e. the aircrew are waiting and burning gas, or they’ve already begun the maneuver without your clearance.

Effects of Errors

1. Confusion ensues about if the test point has actually begun, if aircrew are on parameters, or if clearance has already been issued, requiring a conversation. 2. TC loses control of the mission and the trust/confidence of the aircrew because aircrew have gone rogue, not wanting to burn gas and time waiting for your clearance.

Plain English Antidote

“We are on test point XX. We show good setup. The control room is ready. You are cleared to maneuver.”

A.4 STEP

Correct Usage

“CLEARED CARD [card identifier] STEP [setup/procedure/recovery step identifier]”

Meaning

A way to clearly refer to a step in a setup, procedure, or recovery without explicitly describing the action. Often used to obfuscate test actions over unencrypted communications channels. Can also be used to avoid saying “special” words like “ABORT” if they are part of the procedure.

Typical Errors

1. Saying the wrong step, or not indicating the card
2. Describing the actions explicitly

Effects of Errors

1. Confusion and loss of situational awareness
2. Exposing test activities unnecessarily

Plain English Antidotes

1. “We are on card [card identifier], complete step [step identifier]”
2. “We are on card [card identifier], complete step [step identifier]”

A.5 CONCUR

Correct Usage

“CONCUR”

Meaning

I have heard your proposed course of action and I agree with it.

Typical Errors

1. “...” (crickets)
2. “CONFIRM”
3. “AFFIRMATIVE”
4. “COPY”

Effects of Errors

1. Aircrew have no idea why they are waiting, if the radios are broken, and generally if you are still alive and breathing 2. Answering a proposal with a request. 3. Answering a complicated proposal with a simple “yes” 4. Aircrew are left wondering you have any opinion.

Plain English Antidote

“I agree”

A.6 “CONFIRM

Correct Usage

“CONFIRM [declarative statement]”

Meaning

I am requesting that you reply with your understanding of something or with the current status of something.

Typical Error

Convolutd verbiage

Effects of Error

Confusion

Plain English Antidote

“Is the [THING] in [STATE]?”

A.7 CONTINUE

Correct Usage

“CONTINUE”

Meaning

Keep going. (Alternative: I have heard you, but your concern can be addressed later.)

Typical Errors

1. “...” (crickets)
2. “HOLD”

Effects of Errors

1. Aircrew have no idea why they are waiting, if the radios are broken, and generally if you are still alive and breathing.
2. Aircrew confusion, since they may not be expecting to hold their current flight condition, or since they brought up a concern.

Plain English Antidotes

1. Say something/anything.
2. “Keep doing what you’re doing.”

A.8 AFFIRM

Correct Usage

“AFFIRM”

Meaning

Yes

Typical Errors

1. “ROGER”
2. “COPY”
3. “CONCUR”
4. “CONFIRM”

Effects of Errors

1. Answering a question with “I heard you” brings things to a halt
2. Answering a question with “I heard you and have recorded what you said” brings things to a halt
3. Answering a question with “I have heard your proposed course of action and I agree with it” brings things to a halt
4. Answering a question with “I am requesting that you reply with your understanding of something or with the current status of something” brings things to a halt

Plain English Antidote

“Yes”

A.9 NEGATIVE

Correct Usage

“NEGATIVE”

Meaning

No

Typical Errors

See “AFFIRM”

Effects of Errors

See “AFFIRM”

Plain English Antidotes

“No”

A.10 ACKNOWLEDGE

Correct Usage

“ACKNOWLEDGE”

Meaning

I have updated something and am requesting verbal acknowledgement from all players.

Typical Error

“...” (crickets)

Effects of Error

1. You don't know that the test team has heard the update
2. The test team doesn't know you have heard the update.

Plain English Antidotes

1. Repeat the transmission and request acknowledgement.
2. Repeat back the transmission verbatim: “The control room copies new floor 10K.”

A.11 WHEN ABLE

Correct Usage

“WHEN ABLE”

Meaning

It sounds like you're busy, but I've got something to discuss, so get back to me when you can talk

Typical Error

Talking over or into a busy pilot's conversation/thought process

Effect of Error

Increased frustration

Plain English Antidote

“I've got a question/piece of information when you have a chance.””

A.12 STANDBY

Correct Usage

“STANDBY”

Meaning

I have heard you, but I’m unable to reply to your transmission in detail at this time. In a moment, I will say more.

Typical Errors

1. “...” (crickets)
2. “HOLD”

Effects of Errors

1. Aircrew have no idea why they are waiting, if the radios are broken, and generally if you are still alive and breathing. Also waste of gas/resources as aircrew come off conditions.
2. Aircrew confusion, since they may not be expecting to hold their current flight condition

Plain English Antidotes

1. Say something/anything.
2. “Wait a moment while we discuss.”

A.13 HOLD

Correct Usage

“HOLD”

Meaning

Maintain current conditions until further notice.

Typical Errors

1. “...” (crickets)
2. “STANDBY”

Effects of Errors

1. Aircrew have no idea why they are waiting, if the radios are broken, and generally if you are still alive and breathing
2. Aircrew confusion, since they may not be expecting to be told to wait for you to get back to them.

Plain English Antidotes

1. Say something/anything.
2. “Keep doing what you’re doing.” or “Stay on current conditions.”

A.14 ...

Correct Usage

“ ... ”

Meaning

A pause between transmissions to allow the test team to interject. Often used in countdowns to irreversible events.

Typical Errors

1. Holding the transmission key for the full duration of the countdown
2. Too short of a pause

Effects of Errors

1. The test team cannot interject to prevent mistaken triggering of the irreversible event
2. The aircrew don't have time to listen for interjections

Plain English Antidotes

1. “...”
2. (waiting long enough to listen for test team inputs)

A.15 INCREASE/DECREASE

Correct Usage

“INCREASE/DECREASE [PARAMETER]”

Meaning

Per the brief and the mission materials, the parameter is about to go out of tolerance/limits unless you comply with this advisory call.

Typical Errors

1. “CHECK/WATCH [PARAMETER]”
2. “...” (crickets)

Effects of Errors

1. Aircrew doesn’t know what you want after they look at the parameter. The parameter probably dropped out of their scan, which necessitated the call in the first place, so they aren’t aware of the corrective action.
2. Test point needs to be repeated, test limits are exceeded, aircraft limits are exceeded.

Plain English Antidotes

1. “Your [PARAMETER] is approaching [TOLERANCE/LIMIT].”
2. Say something/anything.

A.15.1 CAVEAT

This phrasing is up for debate, and this standard is provided as a baseline. If the test team deviates from the baseline, they should do so explicitly and intentionally.

A.16 CEASE

Correct Usage

- CEASE LASER
- CEASE FIRE

Meaning

Discontinue the stated activity

Typical Errors

- “CEASE” (without specifying what activity to discontinue)
- “STOP” (without specifying what activity to discontinue)

Effects of Errors

- Confusion about what to discontinue
 - Discontinue the wrong activity
 - Continuing the activity

Plain English Antidotes

- “Turn off [system]”
- “Stop doing [activity]”

A.17 TERMINATE/ABORT/KNOCK-IT-OFF

Correct Usage

- “TERMINATE”
- “ABORT ABORT ABORT”
- “KNOCK-IT-OFF”

Example:

- Project: “ABORT ABORT ABORT”
- Quell 1: ““Quell 1 ABORT””
- Quell 2: ““Quell 2 ABORT””
- Project: ““Project ABORT, [REASON]””

Example:

- Test: ““Terminate,
- Test Terminate””
- Chase: ““Chase Terminate””
- Project: ““Project Terminate””

Meaning

Per the brief and the mission materials, stop what you’re doing and take corrective action.

Typical Errors

1. Not reacting per the brief
2. The originator not saying the reason for the call.

Effect of Errors

Confusion during time-critical events

Plain English Antidotes

1. Because of the urgent nature of these calls, it’s better to say the wrong thing than to say nothing. The best this is to practice the calls in the brief and over the radio prior to beginning test execution.
2. Say something/anything.

A.17.1 NOTE

Which specific term to use depends on the test team's prior experience, the organization's norms, and the context. There are examples of "Terminate" being used on some test ranges as the word to signal the Flight Termination System, negating the test and possibly exposing the aircrew to additional hazards.

Abrupt test point cessation calls should be rehearsed in the brief, and in the air prior to testing, to establish the norm for the day.

A.18 COMPLETE

Correct Usage

- “RUN COMPLETE”
- “POINT COMPLETE”
- “CARD COMPLETE”
- “MISSION COMPLETE”

Meaning

The referenced set (RUN/POINT/CARD/MISSION) was executed within the success criteria per the brief and mission materials. No further action for the referenced set is required or desired.

In the case of MISSION COMPLETE, the data, fuel, aircraft, or formation requires that the test portion of the mission must conclude.

Typical Errors

1. Saying “COMPLETE” before you know if execution was successful.
2. Saying “COMPLETE” before the set was finished.
3. Saying “COMPLETE” when what you really mean is “TERMINATE/ABORT/KNOCK-IT-OFF”
4. “...” (crickets)
5. Instead of “MISSION COMPLETE,” “CLEARED TO RTB”

Effects of Errors

1. Either you’re lucky and the set was actually complete, or you have to eat your words and call for a repeat because the set was not, in fact, complete.
2. The aircrew cease execution prior to completion, negating the data and wasting millions of dollars of taxpayer money.
3. The aircrew aren’t aware that something is wrong and continue with the test, possibly repeating the mistake or exceeding a limit.
4. Bueller?... Bueller?... Bueller?
5. ATC hears “RTB” and begins coordination before the aircrew are ready.

Plain English Antidotes

1. “Standby for data review.”
2. Say nothing until the set is complete.
3. “Mach/airspeed/altitude out of parameters. We’ll need to repeat that point.”
4. “The control room is satisfied with this run/point/card/mission.”
5. See 4.

A.19 NEXT

Correct Usage

“NEXT [POINT/CARD/FLIGHT CONDITION]”

Meaning

The next thing is...

Typical Error

“...” (crickets)

Effects of Error

Two effects, depending on aircrew.

1. Either the aircrew wait and wonder what's next, or
2. the aircrew declare what's next and the control room loses control of the mission.

Plain English Antidote

“Next point is X, at X feet and X Mach/KCAS.”

A.20 CLEAN AND DRY

Correct Usage

- “REQUEST CLEAN AND DRY”
- “CHASE SHOWS YOU CLEAN AND DRY”

Meaning

Extends the concept of a “battle damage check” which is looking for “clean” meaning no visible damage and “dry” meaning no visible fluid leaks.

In flight test, “clean” can also mean no excessive door and/or panel gaps, no missing fasteners, or any other mechanical change from the previous check. Often made after gear retraction, before and after a high speed test point, prior to aerial refueling after high load or flutter test, and before returning to base.

Typical Errors

None

Effects of Errors

None

Plain English Antidotes

None

A.21 Codes NOT to use

1. ROGER
2. COPY
3. WILCO

They all leave out a very important factor. WHAT is being received, received and written, or complied with.

Better to be explicit.

1. “I understand” And better “I understand [then say what you understand]”
2. Read back what you just heard
3. “I will [do the thing you just requested]”

B Multiservice Codes Applicable to Flight Test

B.1 Symbol Keys

Codes most often misused are indicated with an warning symbol and include an explanation of how to avoid misuse.

The Type is shown in curly braces indicates whether a code is meant to:

- {D} Direct
- {I} Inform
- {R} Request

Table B.1: Key to Multi-Service Brevity Codes

Symbol or Abbreviation	Brevity code meaning applies to
[A/A]	Air-to-air (A/A) operations or communications.
[A/S]	Air-to-surface (A/S) operations or communications.
[S/A]	Surface-to-air (S/A) operations or communications.
[SO]	Space operations (SO) or communications.
[S/S]	Surface-to-surface (S/S) operations or communications.
[EW]	Electromagnetic warfare (EW) operations or communications.
[AIR-MAR]	Maritime air (AIRMAR) operations or communications.
[MAR-MAR]	Maritime to maritime (MAR-MAR) operations or communications.

B.2 Attention-Getting Codes

Attention-Getting codes have significant potential for miscommunication. This is often because test aircrew and operators were trained in an operational context, whereas test and range personnel were trained in a test context. Because of the urgent nature of attention-getting codes, they must be carefully defined for each test and briefed carefully.

Table B.2: Attention-Getting Brevity Codes

Attention-Getting Brevity Code	Definition	Flight Test Context
ABORT	{D} Cease action or terminate the attack prior to weapons release or event or mission.	Per the comm plan, but typically used when test limits or boundaries have been or will be exceeded. Usually implies a briefed abort procedure.
[system] BENT/SICK	{I} System indicated is inoperative/degraded. Cancelled by SWEET	Describing system difficulties
BINGO	{I} Pre-briefed fuel state needed for recovery.	Briefed fuel state that triggers an automatic decision to terminate testing and return to base.
BLIND	{I} No visual contact with FRIENDLY aircraft, ship, or ground position. Opposite of VISUAL.	Could be a test or a safety consideration.
BOGEY	{I} A radar or visual air CONTACT whose identity is unknown.	An indication of “stranger traffic” that could interfere with test execution.
CEASE [activity]	{I} Discontinue stated activity; e.g., CEASE BUZZER, CEASE LASER, CEASE SPARKLE, CEASE TORCH, etc.	A generally useful term

Attention-Getting Brevity Code	Definition	Flight Test Context
CONTACT(S)	<ol style="list-style-type: none"> 1. {I} Sensor information at the stated position. 2. {I} [A/S] Acknowledges sighting of a specified reference point (either visually or via sensor). 3. {I} [A/A] Individual radar return within a GROUP or ARM. 	Could change required separations per the safety considerations, i.e. strict altitude separation required until CONTACT, then 1000 foot bubble.
DIVERT	{D} Proceed to alternate mission/base.	Directing to alternate landing site for WX/MX/other
JOKER	{I} Fuel state above BINGO at which separation, bugout, or event termination should begin.	<p>Briefed fuel state that indicates a decision point in the test flow.</p> <p>Can have multiple jokers for various reasons (tanker, altitude block change, etc.) as determined by test team.</p>
KNOCK-IT-OFF	{D} [A/A] [A/S] Cease all air combat maneuvers, attacks, activities, or exercises (training use only).	In test, typically used to indicate a safety of flight concern, directing termination of testing and resumption of “normal” flight. Followed by discussion of cause and next action to be taken.
[object] NO FACTOR	{I} [A/A] [A/S] [S/A] Stated [object] is not a threat.	Declaring that an identified object will not interfere with safety of flight or test.

Attention-Getting Brevity Code	Definition	Flight Test Context
NO JOY	<ol style="list-style-type: none"> 1. {I} [A/A] [A/S] [S/A] [SO] Aircrew does not have visual contact with the TARGET or BANDIT. Opposite of TALLY. 2. {I} Indicates that radio communications could not be established with the distant end on a specified radio net. 	Similar to BLIND, but BLIND is for FRIENDLY; NO JOY is for everyone else.
PADLOCKED	{I} Aircrew cannot take eyes off an aircraft, ground target, or surface position without risk of losing TALLY or VISUAL.	Indicates aircrew is task saturated and channelized.
SOUR	<ol style="list-style-type: none"> 1. {I} (mode/type) [A/A] [S/A] Invalid or no response to an administrative IFF or selective ID feature check. 2. {I} (link name) (e.g., "TIMBER SOUR") Potential problems with net entry; initiates pre-mission link troubleshooting. (Opposite of SWEET) 	Useful in systems testing to indicate that testing will be affected by system problems.
STRANGER	{I} [A/A] Unidentified traffic that is not a participant in the action in progress.	Traffic that could conflict with test execution or flight safety.
TALLY	{I} Sighting of a target, non-friendly aircraft, or enemy position. Opposite of NO JOY.	Can be used to indicate successful sighting during test execution.

Attention-Getting Brevity Code	Definition	Flight Test Context
TERMINATE	{D} [A/A] In training, cease local engagement without affecting the overall exercise.	Often used to cease test point execution, prior to test point completion. In test, this means whatever the test team briefed it to mean, but the meaning is typically different from standard brevity code. BE CAREFUL TO CLEARLY DEFINE USE WHEN FLIGHT TERMINATION SYSTEMS ARE EMPLOYED!!!
TUMBLEWEED	{I + R} I have limited situational awareness (i.e., NO JOY, BLIND), and I request information.	HELP!! Can be used to indicate extreme disorientation.
VISUAL	{I} Sighting of a FRIENDLY aircraft, ground position, or ship. Opposite of BLIND.	Could change required separations per the safety considerations, i.e. strict altitude separation required until VISUAL, then 1000 foot bubble.

B.3 Informative Geometry Codes

Informative Geometry codes communicate a general condition. They do not often have test-specific meanings, but test teams can make use of the test aircrew and operators prior training to provide clarity and reduce communication bandwidth.

Table B.3: Informative Geometry Brevity Codes

Informative Geometry Brevity Code	Definition
ANCHOR [location]	1. {D} Orbit about a specific point. 2. {I} Refueling track flown by tanker.
ANCHORED [location]	{I} [A/A] Turning engagement at the specified location.
FEET WET/DRY	{I} Flying over water/land.

Informative Geometry Brevity Code	Definition
IN [direction]	<ol style="list-style-type: none"> {I} [A/A] Turning toward a known threat. Opposite of OUT. {I} [A/S] Entering terminal phase of an air-to-ground attack. Opposite of OFF.
MARSHAL(ING)	{D or I} Establish(ed) at a specific point, typically used to posture forces in preparation for an offensive operation.
OFF [direction]	{I} [A/A] [A/S] Attack is terminated, and maneuvering to the indicated direction.
OUT [direction]	{D or I} [A/A] Turn or turning to a cold aspect relative to a known threat.
PUSHING	{I} [A/A] Departing designated point.
SADDLED	{I} [A/A] Wingman or element has returned to briefed formation position. Cancels STRIPPED
STRIPPED	{I} [A/A] Aircraft is out of prebriefed formation. Opposite of SADDLED.

B.4 Relative Geometry Codes

Relative Geometry codes provide relationship between two air vehicles, both location and angles. They do not often have test-specific meanings, but test teams can make use of the test aircrew and operators prior training to provide clarity and reduce communication bandwidth.

Table B.4: Relative Geometry Brevity Codes

Relative Geometry Brevity Code	Definition
BEAM [direction]	{I} [A/A] CONTACT stabilized within 70 to 110 degrees of aspect.

Relative Geometry Brevity Code	Definition
BRAA	<ol style="list-style-type: none"> 1. {I} [A/A] [S/A] The following information is in a tactical control format providing target bearing, range, altitude, and aspect (BRAA) relative to the specified FRIENDLY aircraft. 2. {D} Switch to BRAA format to a specific GROUP or CONTACT.
BULLSEYE	<p>{I} An established reference point from which the position of an object can be referenced by bearing (magnetic) and range (nautical miles) from this point.</p> <p>Extremely important! Ensure that the BULLSEYE is briefed. "Bullseye 050 at 50 miles."</p> <p>Think polar coordinates with a briefed origin, instead of the Cartesian lat/long coordinates.</p>
CLOSING	<p>{I} [A/A] Decreasing separation.</p> <p>Opposite of OPENING.</p>
COLD	<ol style="list-style-type: none"> 1. {D or I} [A/A] Initiate(ing) a turn in the combat air patrol away from the anticipated threats. 2. {I} [A/S] Defined area is not expected to receive fire (enemy or FRIENDLY). 3. {I} [A/A] Intercept geometry will result in a pass or roll out behind the target. 4. {I} [A/A] CONTACT aspect stabilized 0–20 degrees from the tail or 160–180 degrees from the nose. 5. {I} [A/S] CONTACT aspect stabilized 0-20 degrees or 160-180 degrees from referenced position (friendly forward operating base, named area of interest (NAI), target area, etc.). 6. {I} [AIR-MAR] CONTACT aspect stabilized 0-20 degrees from stern or 160-180 degrees from bow.
DRAG [cardinal direction]	<p>{I} [A/A] CONTACT aspect stabilized at 0–60 degrees angle from tail or 120–180 degrees angle from nose.</p>
FLANK [direction]	<p>{I} [A/A] CONTACT aspect stabilized at 120–150 degrees angle from tail or 30–60 degrees angle from nose.</p>

Relative Geometry Brevity Code	Definition
HOT	<ol style="list-style-type: none"> 1. {D or I} [A/A] Initiate or initiating a turn in the combat air patrol toward the anticipated threats. Opposite of COLD. 2. {I} Defined area is expected to receive fire (enemy or FRIENDLY). Opposite of COLD. 3. {I} Ordnance employment intended or completed. Opposite of DRY. 4. {I} CONTACT aspect stabilized at 160–180 degrees angle from tail or 0–20 degrees angle from nose. 5. {I} [A/A] Intercept geometry will result in passing in front of the target.
LEVEL	<ol style="list-style-type: none"> 1. {I} Contact is co-altitude (interflight call). 2. {I} Briefed altitude has been reached.
OPENING	{I} [A/A] Increasing separation. Opposite of CLOSING.

B.5 Picture Geometry Codes

“**Picture**” **Geometry** codes provide an overview of the tactical airspace. They do not often have test-specific meanings, but test teams can make use of the test aircrew and operators prior training to provide clarity and reduce communication bandwidth.

Table B.5: “Picture” Geometry Brevity Codes

“Picture” Geometry Brevity Code	Definition
PICTURE	{R} [A/A] [A/S] [AIR-MAR] A request to provide information pertinent to the mission in a digital bullseye format unless briefed otherwise.
NEW PICTURE	{I} [A/A] [A/S] [AIR-MAR] Used by controller or aircrew when tactical PICTURE has changed. Supersedes all previous calls and reestablishes PICTURE for all players.

“Picture” Geometry	
Brevity Code	Definition
GROUP(S)	<ol style="list-style-type: none"> {I} [A/A] Any number of air CONTACT(S) within 3 nautical miles in azimuth and range of each other. [AIR-MAR] Any number of surface CONTACTs within 1 nautical miles of each other.
SINGLE	{I} [A/A] [AIR-MAR] One GROUP, CONTACT, etc.
HEAVY	{I} [A/A] [AIR-MAR] A GROUP known to contain three or more CONTACTs.
PACKAGE	{I} [A/A] Geographically isolated collection of GROUPs outside of briefed range.
[direction] ARM	{I} [A/A] [AIR-MAR] CONTACT(S) within a single GROUP that maneuvers outside of the GROUP criteria.
CLEAN	<ol style="list-style-type: none"> {I} [A/A] No sensor information on a GROUP of interest. {I} No visible battle damage. For Battle Damage (BD) checks “Clean and Dry” means no damage and no leaking fluids. {I} Aircraft not carrying external stores. Aircraft configuration. Be careful and be specific. Better to state explicitly the required configuration than to just say “clean.”
2 Groups	
AZIMUTH	<ol style="list-style-type: none"> {I} [A/A] [AIR-MAR] A picture label describing two GROUPs separated laterally. GROUP names will be referenced by cardinal directions (e.g., NORTH GROUP, SOUTH GROUP, or EAST GROUP, WEST GROUP). [S/A] Direction to the threat.
ECHELON	{I} [A/A] [AIR-MAR] Fill-in to a picture label describing GROUPs aligned behind and to the side of the closest GROUP.
[subcardinal direction]	
RANGE	{I} [A/A] [AIR-MAR] A PICTURE label describing two GROUPs separated in distance along the same line of bearing. GROUP names will be LEAD GROUP or TRAIL GROUP.
3+ Groups	
BOX	{I} [A/A] [AIR-MAR] Picture label with GROUPs in a square or offset square.

“Picture” Geometry	
Brevity Code	Definition
CHAMPAGNE	{I} [A/A] [AIR-MAR] A picture label of three distinct GROUPs with two in front and one behind. GROUP names should be NORTH LEAD GROUP and SOUTH LEAD GROUP or WEST LEAD GROUP and EAST LEAD GROUP and TRAIL GROUP.
LADDER	{I} [A/A] [AIR-MAR] Picture label with three or more GROUPs on the same azimuth but separated by range. GROUP names should be LEAD GROUP, SECOND GROUP, THIRD GROUP, and TRAIL GROUP or LEAD GROUP, MIDDLE GROUP, and TRAIL GROUP.
VIC	{I} [A/A] [AIR-MAR] Picture label with three GROUPs with the single closest in range and two GROUPs, AZIMUTH split, in trail. GROUP names should be LEAD GROUP and NORTH TRAIL GROUP and SOUTH TRAIL GROUP or EAST TRAIL GROUP and WEST TRAIL GROUP.
WALL	{I} [A/A] [AIR-MAR] Picture label with three or more GROUPs primarily split in azimuth. GROUP names should be NORTH GROUP, MIDDLE GROUP, SOUTH GROUP or WEST GROUP, MIDDLE GROUP, EAST GROUP.
Separation	
DEEP	{I} [A/A] [AIR-MAR] Indicates separation between the nearest and farthest GROUPs in range in a relative formation of three or more GROUPs, used to describe a LADDER, VIC, CHAMPAGNE, or BOX.
STACK	<ol style="list-style-type: none"> 1. {I} [A/A] Two or more CONTACTs within GROUP criteria with an altitude separation in relation to each other (typically above $\geq 10,000$ foot separation). 2. {R} Request all airborne players and their assigned altitude block in the specified area.
WEIGHTED [cardinal direction]	{I} [A/A] [AIR-MAR] Fill-in for a CHAMPAGNE, VIC, WALL, or LADDER when one or more GROUPs are out of position or offset from the standard picture label.
WIDE	{I} [A/A] [AIR-MAR] Separation between the farthest GROUPs in azimuth in a relative formation of three or more GROUPs, used to describe a WALL, VIC, CHAMPAGNE, or BOX.
Inner	
CONTAINER	{I} [A/A] [AIR-MAR] Inner GROUP formation with four CONTACTs oriented in a square or offset square.

“Picture” Geometry	
Brevity Code	Definition
LEAD-TRAIL	{I} [A/A] [A/S] [AIR-MAR] Inner GROUP formation of two CONTACTS separated in range.
LINE ABREAST	{I} [A/A] [AIR-MAR] Inner GROUP formation of two or more contacts separated in azimuth.
STINGER	<ol style="list-style-type: none"> 1. {I} [A/A] [AIR-MAR] Three-ship inner GROUP formation with two lead CONTACTs line abreast and the SINGLE in trail. 2. {I} [S/A] An IR man portable air defense system (MANPADS).
WEDGE	{I} [A/A] [AIR-MAR] Three-ship inner GROUP formation with a single CONTACT closest in range and two trail CONTACTs line abreast.
Maneuvers	
CROSSING	{I} [A/A] Two GROUPs initially separated in azimuth decreasing azimuth separation to pass each other.
JOINED	{I} [A/A] Two or more radar returns have come together.
MANEUVER [azimuth, range, altitude]	{I} [A/A] [AIR-MAR] Specified GROUP is maneuvering in azimuth, range, and/or altitude.
MARSHALING	{I} Established at a specific point, typically used to posture forces in preparation for an offensive operation.
MERGED	{I} [A/A] FRIENDLIES and targets have arrived in the visual arena.
PASSING	{I} [A/A] Two GROUPs initially separated in range, decrease range separation and are passing each other.
SWITCHED	{I} [A/A] Attacker is changing from one aircraft to another.
TRACK [direction]	<ol style="list-style-type: none"> 1. {I} [A/A] GROUP or CONTACTS direction of flight or movement. 2. {D} [A/S] [S/S] Directive call assigning responsibility to an asset for maintaining sensor or visual observation of a defined object or area. 3. {D} [A/S] Rotary wing directive call to establish race track (e.g., “Taz 31, TRACK left). 4. {I} [A/S] [AIR-MAR] Information call stating direction of vehicle or CONTACT in motion (e.g. TALLY TECHNICAL TRACK Northwest).

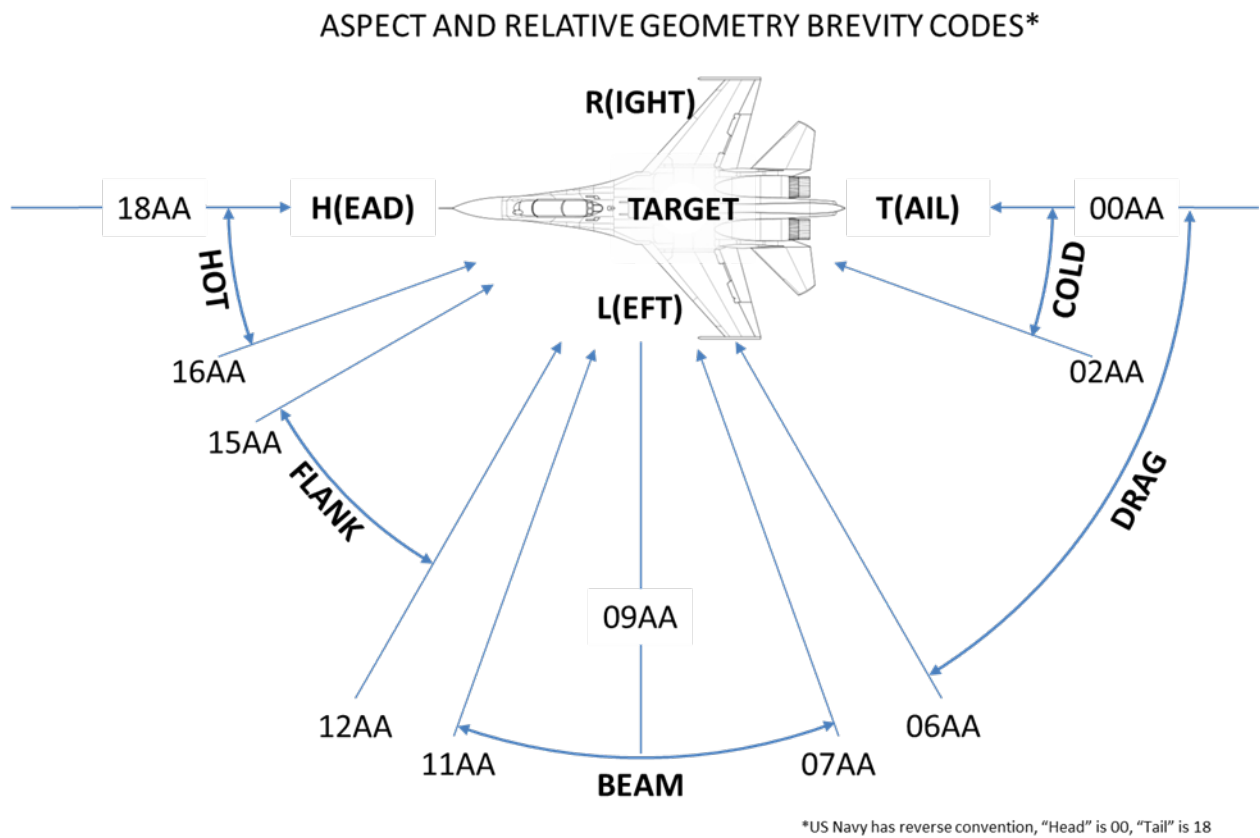


Figure B.1: The Relation Between Aspect Angles and Relative Geometry Brevity Codes

B.6 Single-Ship Maneuver Codes

Single-ship maneuver codes direct or describe single-ship maneuvers. They do not often have test-specific meanings, but test teams can make use of the test aircrew and operators prior training to provide clarity and reduce communication bandwidth.

Table B.6: Single-Ship Maneuver Brevity Codes

Single-Ship Maneuver Brevity Code	Definition
BANZAI	{D or I} [A/A] Execute(ing) launch and decide tactics with the intent to maneuver into the visual arena. Launch your missiles, then continue to the target. May end up as a merge. Not common in DT, but significant for OT tactics. Also, fun to say, with aerial combat overtones.
BRACKET [direction]	{D} [A/A] [A/S] Maneuver to a position on opposite sides, either laterally or vertically from the target.
BUSTER	{D or I} Fly at maximum continuous speed (military power).
CRANK [direction]	{D} [A/A] Maneuver in the direction indicated. Implies illuminating target at or near radar GIMBAL limits.
EXTEND(ING) [direction]	{D or I} [A/A] [A/S] Short-term maneuver to gain energy, distance, or separation with the intent of reengaging.
GATE	{D or I} Fly as quickly as possible, using afterburner or maximum power.
HOT	<ol style="list-style-type: none"> {D or I} [A/A] Initiate or initiating a turn in the combat air patrol toward the anticipated threats. Opposite of COLD. {I} Defined area is expected to receive fire (enemy or FRIENDLY). Opposite of COLD. {I} Ordnance employment intended or completed. Opposite of DRY. {I} CONTACT aspect stabilized at 160–180 degrees angle from tail or 0–20 degrees angle from nose. {I} [A/A] Intercept geometry will result in passing in front of the target.
JINK	{D or I} [A/A] [A/S] Perform an unpredictable maneuver to negate a tracking solution.

Single-Ship Maneuver

Brevity

Code	Definition
LEAN [direction]	{D or I} [A/A] [A/S] Offset package or element in specified direction maintaining briefed altitude, airspeed, and formation.
NOTCH(ING) [direction]	{D or I} [A/A] [A/S] [S/A] Aircraft is in a defensive position. Maneuver(ing) with reference to a threat.
OFFSET [direction]	{D or I} Maneuver in a specified direction with reference to the target.
PUMP	{D or I} [A/A] A briefed maneuver to minimize closure on the threat or geographical boundary with the intent to reengage.
SKATE	{D or I} A/A] Informative or directive call to execute launch and leave tactics at a pre-briefed range. Modifiers can include LONG and SHORT.
	Launch your missiles, then turn away to fight another day prior to a briefed distance from the target.
STERN	{D or R} [A/A] Requests for, or directive to, intercept using STERN geometry.

Turns

CHECK [number, left or right]	{D} [A/A] Turn (number) degrees left or right and maintain new heading.
COME OFF [direction]	<ol style="list-style-type: none"> {D} [A/A] Maneuver as indicated to either regain mutual support or to deconflict flight paths. Implies both VISUAL and TALLY. {D} [A/S] Maneuver or execute a specific instruction.
HARD [left, right, direction]	{D} High-G-force, energy sustaining turn in the indicated direction (default is a 180-degree turn).
HOOK	<ol style="list-style-type: none"> {D} (direction) [A/A] Perform an in-place, 180-degree turn. {D} (track # or descriptor) Data link directive call to cue sensors to described point (e.g., point of interest, SAM, MARKPOINT, track number, etc.).
IN PLACE [direction]	{D} [A/A] Perform indicated maneuver simultaneously.
PITCH/PITCHBACK [left/right]	{D} [A/A] Execute a nose-high heading reversal.
SLICE/SLICEBACK [left/right]	{D} [A/A] Perform a high-G descending turn in the stated direction, usually 180-degree turn.

Non-Engagement

Single-Ship Maneuver Brevity Code	
Code	Definition
FLOAT(ING)	{D or I} [A/A] Expand(ing) the formation laterally within visual limits to maintain radar contact or prepare for a defensive response.
FLOW [direction or heading]	{D or I} [A/A] Maneuver in stated direction or heading. Can be used to begin cold operations.
MARSHAL(ING)	{D or I} Establish(ed) at a specific point, typically used to posture forces in preparation for an offensive operation.
POP	<ol style="list-style-type: none"> 1. {I} [A/S] Starting climb for A/S attack. 2. {D or I} [A/A] Max performance climb out of low-altitude structure.
POST HOLE	{D or I} [A/A] Rapid descending spiral.
SHACKLE	{D or I} [A/A] One weave; a single crossing of flight paths; maneuver to adjust or regain formation parameters.
SPIN	{D or I} [A/A] Execute(ing) a timing or spacing maneuver.
SPLIT	{D or I} Flight member is leaving formation to pursue a separate attack; VISUAL may not be maintained.

B.7 Request Codes

Request codes compress questions into single words. They do not often have test-specific meanings, but test teams can make use of the test aircrew and operators prior training to provide clarity and reduce communication bandwidth.

Table B.7: Request Brevity Codes

Request Brevity Code	Definition
POSIT	{R} Request for FRIENDLY position; response in terms of a geographic landmark or from a common reference point.

Request Brevity Code	Definition
STATUS [phase]	<ol style="list-style-type: none"> 1. {R} [A/A] Request for an individual's tactical situation. 2. {R} [A/A] [A/S] Directive call requesting amplifying information on current task or aircraft state. e.g., respond with WORKING, JONESING, VOID, CONTACT, CAPTURE, TARGETED, LOCKED, CLEAN, ENGAGED, FUEL (RED/YELLOW/GREEN), WEAPON (RED/YELLOW/GREEN) ready or plain English.
WHAT LUCK WORDS	{R} Request for results of missions or tasks. {D or R} Directive or interrogative call regarding further information or directives pertinent to the mission.

B.8 Weapon Codes

Weapon codes are related to employment of munitions. They do not often have test-specific meanings, but test teams can make use of the test aircrew and operators prior training to provide clarity and reduce communication bandwidth.

Table B.8: Weapon Brevity Codes

Weapon Brevity Code	Definition
[number, weapon type] AWAY	{I} [A/S] [S/A] Release or launch of specified weapon at designated target (e.g., 1 AWAY, 2 PIGS AWAY, BIRDS AWAY, etc.). At minimum number or weapon type required. NOTE: Include launch location in BULLSEYE format and weapons track direction when appropriate
FOX [number]	{I} [A/A] Simulated or actual launch of air-to-air weapons. (ONE): Semi active radar-guided missile. (TWO): IR-guided missile. (THREE): Active radar-guided missile.
GUNS MILLER TIME	{I} [A/A] [A/S] Aircraft gun is being employed. {I} [A/S] Completion of A/S ordnance delivery. Generally used by the last striker in conjunction with a precoordinated egress plan.

Weapon	
Brevity Code	Definition
PIG(S)	{I} [A/S] FRIENDLY glide weapon(s) (e.g., joint stand-off weapon). See (weapon) AWAY.
RIFLE [number, time]	{I} [A/S] [AIR-MAR] FRIENDLY A/S missile launch. Option to add follow on modifiers for number of munitions and/or time of flight.
RIPPLE	{D or I} [A/S] [S/A] [AIR-MAR] Two or more munitions will be released or fired in close succession. Typically associated with number and type of weapon with release interval. (Normally discussed during the pre-strike game plan between aircraft and/or between aircraft and ground tactical controller).
SHOOTER	{I} Aircraft or unit designated to employ ordnance.
SHOTGUN	{I} [A/A] [A/S] [S/A] Pre-briefed weapons state.
SPLASH(ED)	<ol style="list-style-type: none"> {I} [A/A] Target destroyed. {I} [A/S] Weapons impact. {I} [S/S] Informative call to observer or spotter five seconds prior to estimated time of impact.
TARGET	<ol style="list-style-type: none"> {D} [A/A] [A/S] [S/A] [AIR-MAR] Assignment of targeting responsibilities. {I} [A/S] [S/S] [AIR-MAR] ROE, PID, coordination of forces, and commander's guidance requirements on the referenced target or track have been satisfied. Target or track correlation, CDE, and clear field of fire must be accomplished prior to employing ordnance or fires.
TARGETED	{I} [A/A] Fighter has acquired assigned GROUP and has assumed responsibility for it.

Weapon Brevity Code	Definition
WHAT STATE	<p>{R} [A/A] Request for amount of fuel and missiles remaining. Response to WHAT STATE is:</p> <ol style="list-style-type: none"> 1. (1st number) number of active radar missiles remaining. (2nd number) number of semi-active radar missiles remaining. (3rd number) number of IR missiles remaining. (MINUS) No gun or not sufficient ammunition for gun attack. BY (4th number) thousands of pounds of fuel (given to one decimal point), or time remaining. Example response to WHAT STATE: “Blue 44 is 3-1-2 by 7 POINT 5” is equivalent to 3 AIM-120s, 1 AIM-7, 2 AIM-9s, gun with ammunition, and 7,500 lbs. of fuel remaining. 2. 2. (item) Ammunition and oxygen are reported only when specifically requested or critical.
WINCHESTER	{I} No ordnance remaining.
HARM AGM-88	
ARIZONA	{I} [A/S] [EW] No anti-radiation missile ordnance remaining.
MAGNUM [system, location]	{I} [A/S] [EW] Launch of FRIENDLY anti-radiation missile.
SLAPSHOT [type, bearing]	{D or I} [A/S] [EW] Immediately employ a best available anti-radiation missile against a specified threat at the specified bearing.
SNIPER [type, location (range, bearing)]	{D or I} [A/S] [EW] Employ a range known anti-radiation missile against a specified threat at the specified location.
WORKING	<ol style="list-style-type: none"> 1. {I} (system with location) [EW] Platform gathering electronic EOB on a designated emitter. 2. {I} [A/A] Platform executing electronic ID on a specific aircraft or GROUP to obtain ID necessary for BVR employment.
AMRAAM AIM-120	
CHEAPSHOT	{I} [A/A] Active missile data link terminated between high and medium pulse repetition frequency (MPRF) active.

Weapon Brevity Code	Definition
[2nd] FOX THREE/TWO/ONE [number] SHIP	{I} [A/A] Simulated or actual missile launch against separate targets (assumes one missile per target) (e.g., “SWORD 12, FOX THREE 2 SHIP”). When 2nd prefix is used indicates simulated or actual launch of multiple missiles on the same target.
HUSKY	{I} [A/A] Active radar missile is at high pulse repetition frequency active range.
PITBULL	{I} [A/A] Air intercept missile (AIM)-120 is at MPRF active range.
SKOSH	{I} [A/A] Aircraft is out of or unable to employ active radar missiles.

B.9 Sensor Codes

Sensor codes provide information about radio-frequency, optical, and infrared sensors, as well as lasers used for designation and ranging. They do not often have test-specific meanings, but test teams can make use of the test aircrew and operators prior training to provide clarity and reduce communication bandwidth.

Table B.9: Radar or Sensor Brevity Codes

Sensor Brevity Code	Definition
BUDDY LOCK [position, heading, altitude]	{I} [A/A] Radar locked to a known FRIENDLY aircraft. Normally a response to a SPIKED or BUDDY SPIKE calls.
BUDDY SPIKE [position or heading or alt]	{I} [A/A] FRIENDLY system radar lock-on indication on radar warning receiver.
[target or object] CAPTURED	{I} [A/S] Specified surface target or object has been acquired and is being tracked with an onboard sensor.
CLEAN	<ol style="list-style-type: none"> {I} [A/A] No sensor information on a GROUP of interest. {I} No visible battle damage. For Battle Damage (BD) checks “Clean and Dry” means no damage and no leaking fluids. {I} Aircraft not carrying external stores. Aircraft configuration. Be careful and be specific. Better to state explicitly the required configuration than to just say “clean.”

Sensor Brevity Code	Definition
DEADEYE	{I} Laser designator system inoperative.
DIRT	{I} [S/A] Radar warning receiver indication of surface threat in search mode. See MUD and SINGER.
DROP(PING)	<ol style="list-style-type: none"> 1. {D or I} [A/A] [A/S] Stop(ping) monitoring of specified emitter or target or GROUP and resume(ing) search responsibilities. 2. {D or I} (TRACK number) Remove the emitter or target from tactical picture or track stores. 3. {D or I} [EW] Remove a specific system or EOB category from search responsibilities.
EMPTY	{I} [EW] No emitters of interest detected.
EYEBALL	<ol style="list-style-type: none"> 1. {I} [A/A] Fighter with primary visual ID responsibility. 2. {I} [A/A] Electro-optical (EO), IR, or night vision device acquisition of an aircraft. Normally followed by number of aircraft observed (if more than one).
EYEBALL NARROW	{I} [A/A] EO or IR contacts are viewed in narrow field of view (FOV) and are too close for resolution via radar.
FADED	{I} [A/A] [S/A] [AIR-MAR] Sensor data is lost on GROUP or CONTACT. Requires information of last known position to include number of CONTACTS and TRACK direction.
GIMBAL	{I} [A/A] Sensor target is approaching azimuth or elevation tracking limits.
HIT(S)	<ol style="list-style-type: none"> 1. {I} Momentary radar return(s). 2. {I} (altitude) [A/A] Indicates approximate altitude (e.g., GROUP BULLSEYE 360/10, HITS 15 thousand). 3. {I} [A/S] Weapons had desired effects on the intended target.
JONESING	{I} [A/S] Informative call requiring additional time to analyze current SAR map.
LASER ON	{D} [A/S] [S/S] Directive call to start lasing.
LASING	{I} [A/S] [S/S] The speaker is firing the laser in response to LASER ON.

Sensor Brevity Code	Definition
LOCKED	<ol style="list-style-type: none"> 1. {I} (with GROUP label) [A/A] Radar lock-on; SORT is not assumed. 2. {I} (with position) [A/A] Radar lock-on; correct targeting is not assumed.
LOST LOCK	{I} [A/A] Loss of host radar or IR lock-on.
MAP	{D} [A/S] Directive call to initiate SAR mapping event on a specified point of interest.
MAP COMPLETE	{I} [A/S] Informative call that A/S radar completed mapping and waiting for the map to process / display. JONESING assumed.
MAPPING MARK	{I} Multifunction radar in an A/G mode. <ol style="list-style-type: none"> 1. {D} Record the location of a point or object of interest. 2. {D} [A/S] [S/S] Spotting round, normally white phosphorus or illumination on the deck to indicate targets to aircraft, ground troops, or fire support. 3. {R} [A/A] Challenge and response term for requested aircraft to report contrails.
MONITOR(ING) [GROUP or object]	<ol style="list-style-type: none"> 1. {D or I} [A/A] [A/S] Maintain(ing) sensor awareness on specified GROUP or object. Implies that tactically significant changes will be communicated. 2. {D} [AIR-MAR] Maintain contact or targeting information on a maritime surface contact.
MUD [type with direction, range if able]	<ol style="list-style-type: none"> 1. {I} [A/S] [EW] Radar warning receiver ground threat displayed with no launch indication. 2. {I} [A/S] [EW] Radar warning receiver indication of surface threat in track mode. See DIRT and SINGER.
MUSIC	{I} [A/A] Radar electronic deceptive jamming.
NAILS [direction]	<ol style="list-style-type: none"> 1. {I} [A/A] Radar warning receiver indication of airborne interceptor (AI) radar in search. 2. {I} [A/S] 2.75-inch flechette rockets.
NAKED	{I} [A/A] No radar warning receiver indications.
NEGATIVE CONTACT	Sensor information on a friendly aircraft is lost. Termination of CONTACT, track plotting is not warranted.
RAYGUN [position, heading, altitude]	<ol style="list-style-type: none"> 1. {I} [A/A] Radar lock-on to unknown aircraft. 2. {R} [A/A] A request for a BUDDY SPIKE reply from FRIENDLY aircraft meeting these parameters.

Sensor Brevity Code	Definition
SHIFT [direction]	{D} [A/S] [AIR-MAR] Shift laser, IR, radar, device energy, or aim point. NOTE: Can be used to shift from the offset position onto the target. Also used during multi-aircraft attack to shift laser energy or target assignments.
SINGER [type, direction]	{I} [EW] Radar warning receiver indication of SAM launch. See MUD and DIRT.
SNAPLOCK [BRAA]	{I} [A/A] Informative call indicating fighter has obtained a radar contact inside briefed threat range with BEAM, FLANK, or HOT aspect and is unable to complete sanitization responsibilities implying ownership. A SNAPLOCK call should be responded to with BRAA.
SNIFF [type]	{I} [A/A] [EW] Passive sensor indication of a radar emitter.
SORT	<ol style="list-style-type: none"> {D} [A/A] Assignment of responsibility within a GROUP; criteria can be met visually, electronically (i.e., radar), or both. {D} [A/S] Assignment of specific targeting responsibilities.
SORTED	{I} [A/A] [A/S] [AIR-MAR] Sort responsibility within a GROUP has been met.
SPARKLE	<ol style="list-style-type: none"> {D or I} [A/S] [S/S] Mark or marking target by IR pointer. {I} Platform is IR pointer capable.
SPIKE(D) [direction]	{I} [A/A] [S/A] Radar warning receiver indication of an AI threat in track or launch.
SPOT	<ol style="list-style-type: none"> {I} [A/S] Acquisition of the reflected laser energy. {I} Platform is laser spot tracker capable.
STROBE(S) [bearing]	{I} [A/A] Radar indication(s) of noise jamming.
TIED	{I} [A/A] Positive radar contact with element or aircraft.
TOY	{I} [EW] high speed anti-radiation missile (HARM) targeting system (HTS) pod.

B.10 Avionics/Datalink Codes

Avionics/Datalink codes describe communications, interrogations, identification, and datalink systems and their states. They do not often have test-specific meanings, but test

teams can make use of the test aircrew and operators prior training to provide clarity and reduce communication bandwidth.

Table B.10: Avionics or Datalink Brevity Codes

Avionics/Datalink Brevity Code	Definition
[system] BENT	{I} System indicated is inoperative. Cancelled by SWEET.
[system] SICK	{I} System indicated is degraded or partially operative. Cancelled by SWEET.
[system] SILENT (time)	<ol style="list-style-type: none"> {I} (time) [A/A] System will be unavailable for time indicated. {I or D} Data link is, or should be placed, in receive only. {I or D} [EW] Broadcast station is not transmitting. May also be used as an order and must be followed by a frequency or station designator. If possible, it should be followed by an estimated time of return to the air.
SOUR	<ol style="list-style-type: none"> {I} (mode/type) [A/A] [S/A] Invalid or no response to an administrative IFF or selective ID feature check. {I} (link name) (e.g., "TIMBER SOUR") Potential problems with net entry; initiates pre-mission link troubleshooting. (Opposite of SWEET)
SWEET	<ol style="list-style-type: none"> {I} (mode/type) [A/A] [S/A] Valid response to an administrative IFF or selective ID feature check. {I} (link name) (e.g., "TIMBER SWEET") Confirms receipt of data link information. {I} Equipment indicated is operating efficiently. (Opposite of SOUR; cancels SICK, BENT)
Systems	
PARROT	IFF selective ID feature transponder.
TIMBER	[EW] Link 16 Network.
TOY	[EW] high speed anti-radiation missile (HARM) targeting system (HTS) pod.
UNIFORM	Ultra-high frequency (UHF)/amplitude modulation (AM) radio.
VICTOR	Very-high frequency (VHF)/amplitude modulation (AM) radio.
*PRIME/PRI	Primary radio frequency. UHF if UHF/VHF. UHF1 if UHF1/UHF2.

Avionics/Datalink	
Brevity Code	Definition
*AUX	Auxiliary radio frequency. VHF if UHF/VHF. UHF2 if UHF1/UHF2
Directives	
FENCE [IN/OUT]	{D} Set cockpit switches as appropriate before entering or exiting the combat area.
FLASH [system]	<ol style="list-style-type: none"> 1. {D} [A/A] Temporarily activate specified system for ID purposes (identification, friend or foe (IFF), or afterburner, flare or chaff, etc.). 2. {D} [A/S] [S/S] Clear the net immediately, critical information to follow (e.g., "FLASH, FLASH, FLASH this is Frontier 6, immediate MEDEVAC, grid to follow.").
INTERROGATE	{D} [A/A] [S/S] [AIR-MAR] [MAR-MAR] Interrogate the designated contact of the IFF mode indicated.
SQUAWK [mode, code]	{D or I} [A/A] Operate IFF/selective ID feature as indicated or IFF or selective ID feature is operating as indicated.
SQUAWKING [mode number]	{I} [A/A] [S/A] BOGEY is responding with an IFF or selective ID feature mode or code other than that prescribed by the air tasking order or ID criteria.
STRANGLE [system]	{D} [A/A] [S/A] Turn off system indicated (e.g., STRANGLE PARROT).
TOGGLE [system]	{D} Execute the briefed setting change on specified system.
ZAP	{R} Request for data link information.

B.11 Clearance Codes

Clearance codes have significant potential for miscommunication. This is because there are phases of test execution when a third-party is primarily responsible for clearance (often critical phases such as engine start, taxiing, takeoff, departure, aerial refueling, approach, and landing). There are other phases of test execution where the test team must decide and clarify who is responsible for clearance. The specifics of the test point should be the primary consideration, including how static or dynamic the point is.

Table B.11: Clearance Brevity Codes

Clearance Brevity Code	Definition	Flight Test Context
CLEARED	<p>{D} Requested action is authorized.</p> <p>NOTE: Engaged support roles not established or transferred.</p>	<p>Test point pacing ONLY. DO NOT SAY “CLEARED” WHEN A/C IS ABOUT TO TAXI, TAKE THE RUNWAY, OR LAND.</p> <p>The “cleared” word is reserved in those situations for the controlling agency (ground, tower, etc.). Don’t get your aircrew violated because they acted without clearance from the controlling agency!</p>
CLEARED HOT	{D} [A/S] Type 1 and 2 CAS terminal attack control when granting weapons release clearance to an aircraft attacking a specific target.	<p>NOT FOR THE TEST CONDUCTOR TO SAY!</p> <p>Range control has the hammer.</p>
CONTINUE	{D} Continue present maneuver, does not imply a change in clearance to engage or expend ordnance.	<p>VERY USEFUL. By replying to an aircrew query with “CONTINUE”, you are indicating that you are aware of the situation, you’ve taken it into consideration, and they can safely, securely, effectively, and efficiently proceed with the current course of action.</p>

Clearance		
Brevity Code	Definition	Flight Test Context
CONTINUE DRY	<p>{D} [A/S] Continue present maneuver, ordnance release not authorized. Used to provide approval to aircraft to continue the pass without expending ordnance during Type 1, 2, or 3 control. (JTAC must use “Type 3, CONTINUE DRY” for dry Type 3 control).</p> <p>NOTE: Simulated weapons deliveries may be performed.</p>	From clearance authority.
PRESS	<ol style="list-style-type: none"> 1. {D} [A/A] Requested action is approved and mutual support will be maintained, assumes VISUAL. 2. {D} [A/S] Requested action is approved and mutual support will be maintained. 	Not typically used in flight test conduct, but a very common term in informal settings.
PUSH [channel]	{D} Switch to designated frequency; no acknowledgment required.	Not for you to say, but the flight lead is directing the flight to change frequencies, so follow along.
RESET	{D} [A/A] [S/A] [SO] Proceed to a prebriefed position or area of operations.	Start over, per the brief.
RESUME	{D} [A/A] Resume last formation, route, or mission ordered.	If test point was paused, resume at last step.
ROGER	{I} Radio transmission received; does not indicate compliance or reaction.	One of the more abused brevity codes. Only indicates that you heard, nothing more. “ROGER, COPY” is redundant, as is “ROGER, WILCO.”

Clearance		
Brevity Code	Definition	Flight Test Context
ROLEX [+/- time]	{I} [A/A] [A/S] Timeline adjustment in minutes for entire mission; always referenced from original preplanned mission execution time. “Plus” means later; “minus” means earlier.	Often used when delays have offset briefed mission times.
SAUNTER	{D} Fly at best endurance.	Used when test is on hold.
SKIP IT	{D} Directive call for a specific platform to not engage the indicated track. Usually followed with further directions.	Used to veto aircrew suggestion or to tell aircrew NOT TO PICKLE.
UNABLE	{I} Cannot comply as requested or directed.	Used to indicate inability to comply.
WEAPONS [status]	{D or I} Weapons control status. Fire only: <ul style="list-style-type: none"> • (FREE): At targets not identified as FRIENDLY IAW current ROE. • (TIGHT): At targets positively identified as HOSTILE IAW current ROE. • (HOLD [USAF, USA,USMC] / SAFE [USN]): In self-defense or in response to a formal order. 	Weapons testing.

B.12 Flight Condition Codes

Flight Condition codes provide low-fidelity generalizations of altitude and airspeed. They can be very useful when tight tolerances and databands are not required, but a general condition is desired. They do not often have test-specific meanings, but test teams can make use of the test aircrew and operators prior training to provide clarity and reduce communication bandwidth.

Table B.12: Flight Condition Brevity Codes

Flight Condition Brevity Code	Definition
Speed	
VERY FAST	{I} [A/A] [S/A] Target speed greater than 900 knots/1.5 mach.
FAST	{I} [A/A] Target speed of 600–900 knots ground speed or Mach 1.0 to 1.5.
SLOW	{I} [A/A] [S/A] Target with ground speed of 100–250 knots.
VERY SLOW	{I} [A/A] [S/A] Target speed less than 100 knots.
Altitude	
HIGH	{I} [A/A] [S/A] CONTACT is greater than 40,000 ft mean sea level.
LOW	{I} [A/A] A CONTACT less than 5,000 ft above ground level.

B.13 Rules of Engagement & Identification Codes

Rules of Engagement (ROE) & Identification (ID) codes provide characterizations of the friend/foe status, as well as free/restrained weapons engagements can be. They do not often have test-specific meanings, but test teams can make use of the test aircrew and operators prior training to provide clarity and reduce communication bandwidth.

Table B.13: Rules of Engagement & ID Brevity Codes

ROE & ID Brevity Code	Definition
Discussion	
BOGEY DOPE	{R} [A/A] [S/A] Request for information on indicated or closest GROUP in BRAA format (with appropriate fill-ins).

ROE & ID	
Brevity Code	Definition
DECLARE	{R} [A/A] [S/A] [AIR-MAR] Inquiry as to the ID of a specified track(s), target(s), or correlated GROUP. Responses include: FRIENDLY, BOGEY, BANDIT, HOSTILE, NEUTRAL, UNABLE, CLEAN, or FURBALL. Full positional data (BULLSEYE) must accompany responses.
ID	<ol style="list-style-type: none"> {D} [A/A] [AIR-MAR] Directive call to identify the target or track. {I} (type) [A/A] ID is accomplished, followed by type.
Descriptions in order of FRIENDLY to HOSTILE	
FRIENDLY	{I} A positively identified FRIENDLY aircraft, ship, spacecraft, or ground position.
CHICK(S)	{I} Term used to denote FRIENDLY aircraft.
PRINT [type]	{I} [A/A] Valid noncooperative target recognition reply.
PAINT(S)	{I} [A/A] [AIR-MAR] [MAR-MAR] An interrogated GROUP or radar contact that is responding with any of the specified IFF, or selective ID feature modes and correct codes established for the ID criteria.
BOGEY	{I} [A/A] [S/A] [SO] A CONTACT whose identity is unknown.
SPADES	{I} [A/A] [S/A] [AIR-MAR] An interrogated GROUP or radar contact that lacks all of the air tasking order (or equivalent) IFF or selective ID feature modes and codes required for the ID criteria.
OUTLAW	{I} [A/A] CONTACT has met point of origin criteria for ROE. Point of Origin means that the contact came from a geographic location identified as hostile.
SUSPECT	{I} [SO] An identity applied to a track that is potentially hostile because of its characteristics, behavior, origin, or nationality.
BANDIT	<p>{I} [A/A] [AIR-MAR] Positively identified as an enemy IAW theater ID criteria. The term does not imply direction or authority to engage.</p> <p>[SO] A SUSPECT whose orbital parameters are such that it may become a collection and/or counterspace concern to a spacecraft in the relative near-term, therefore limiting decision space.</p>
STALKER	{I} [SO] A BANDIT with counterspace capability that has significantly refined orbital parameters required to engage a high value asset.

ROE & ID	
Brevity Code	Definition
HOSTILE	<p>{I} A contact identified as enemy upon which clearance to fire is authorized IAW theater rules of engagement.</p> <p>WARNING: This use of HOSTILE is as a brevity term for air-to-air and maritime air engagements and should not be confused with the same term in tactical data link ID and rules of engagement (ROE).</p>

C Unsafe Communication

Dr. Nancy Leveson, in *Engineering a Safer World* (Leveson 2012) and the *STPA Handbook* (Leveson and Thomas 2018), draws on systems theory to describe the importance of control actions in a complex system. An unsafe control action is a control action that, in a particular context and worst-case environment, will lead to a hazard.

C.1 4 ways control actions can be unsafe

There are four ways a control action can be unsafe:

1. Not providing the control action leads to a hazard.
2. Providing the control action leads to a hazard.
3. Providing a potentially safe control action but too early, too late, or in the wrong order.
4. The control action lasts too long or is stopped too soon (for continuous control actions, not discrete ones).

There is some overlap in terminology between the standard flight test objectives: safe, secure, effective, efficient. In this standard terminology, “safe” is defined as avoiding loss or damage to persons or property.

In Dr. Leveson’s framework, unsafe and hazard are more broadly defined in terms of team-defined losses. All four of the standard flight test objectives can be defined in terms of losses:

- Safe = avoiding loss of persons or property or loss of their utility
- Secure = avoiding loss of advantage over an enemy
- Effective = avoiding loss of test objective completion
- Efficient = avoiding loss of time and resources beyond that required to meet test objectives

Therefore, the four ways a control action can be unsafe do apply to all four of the flight test objectives, even though only one is called “safe.”

C.2 Translated to flight test communications

Voice communication is one type of control action. With a small modification, substituting “statement” for “control action,” the four ways provide a useful heuristic for assessing communication errors.

The four ways a statement can lead to loss:

1. Not providing the statement
2. Providing an incorrect statement
3. Providing a statement too early, too late, or in the wrong order
4. The statement lasts too long or not long enough

C.2.1 Omission: Not providing the statement

When a statement is required, but not provided, several consequences can follow.

The shared mental model among the test team can drift. The test aircrew can enter an unsafe condition without awareness. The control room team can proceed to the next test point unaware of an issue on the air vehicle.

Trust between team members can deteriorate. The communications plan is a contract, and adherence to it builds confidence that the team is functioning well. Deviation from the plan, especially unacknowledged deviations, can reduce confidence, even to the point of discontinuing the test.

C.2.2 Negation: Providing an incorrect statement

When an incorrect statement is provided, it can cause an immediate schism in mutual understanding. This is especially true if the statement is made confidently and with full trust of all team members. This can directly and actively lead to a loss of situational awareness.

Again, trust can deteriorate, especially if the incorrect statement was made mistakenly, and other team members recognize the issue.

In any case, significant time and resources can be expended until the incorrect statement is acknowledged by all team members, and a correct statement appropriate for the new context can be substituted.

C.2.3 Succession: Providing a statement too early, too late, or in the wrong order

This is about sequencing of the statement.

In flight test, timing and cadence can be very important. Whether it be weapon delivery, avionics inputs, flight control inputs, formation maneuvers, or many others, the proper timing and succession of actions is imperative.

Statements communicating directives, information, or requests can directly influence the sequence of events.

C.2.4 Duration: The statement lasts too long or not long enough

Something as simple as holding the transmit button on a one-way radio the wrong duration can induce losses. Too long, and others are prevented from passing their own statements. Too short, and the required statement may be cut off.

Brevity itself is an attempt to make a statement last no longer than required, but no shorter, either.

D Test Point Flow

D.1 The problem

Common Test Conduct Errors:

- Omitted or improperly timed communication
- Poor transitions between test points

Hypothesis

A causal factor in both successful and error-prone test conduct is the understanding (or misunderstanding) of where and when critical phases of a test point begin and end.

Which begs the question, what ARE the “critical phases of a test point”?

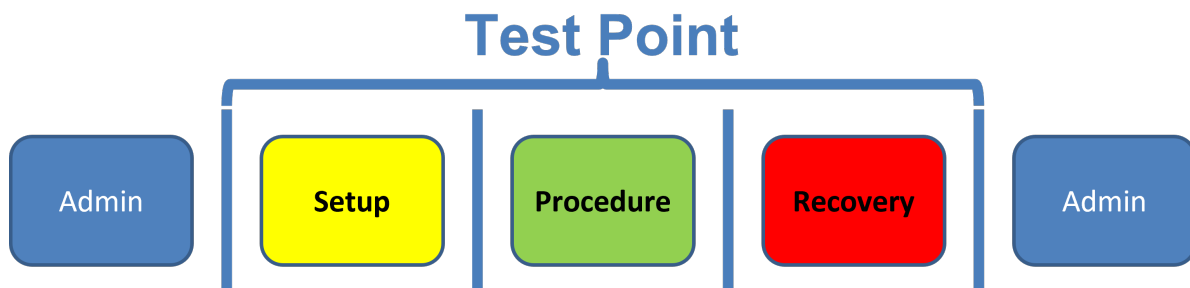


Figure D.1: Structured Approach to Test Point Flow

D.2 A Test Point

The smallest unit of flight test comprised of a beginning, a middle, and an end.

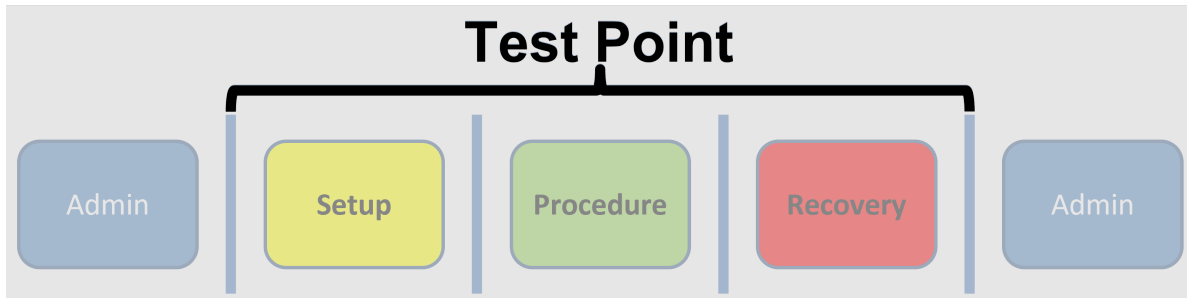


Figure D.2: A Quantum of Test

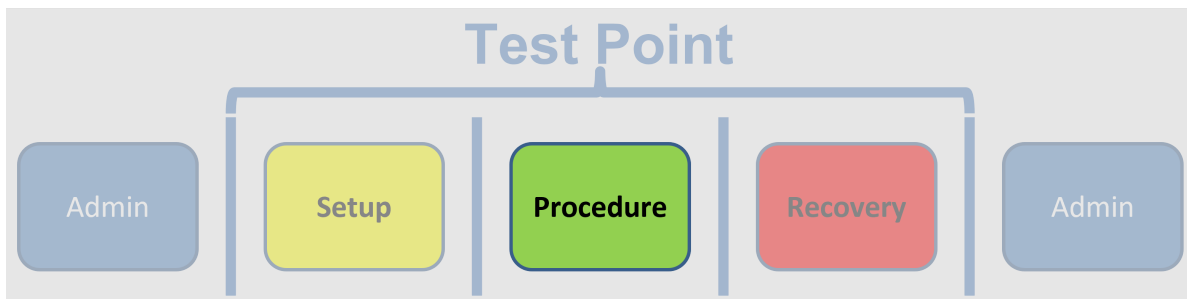


Figure D.3: Where The Data Live

D.3 Procedure

The actions of the operator and the system that generate data to support a test objective

D.4 Setup

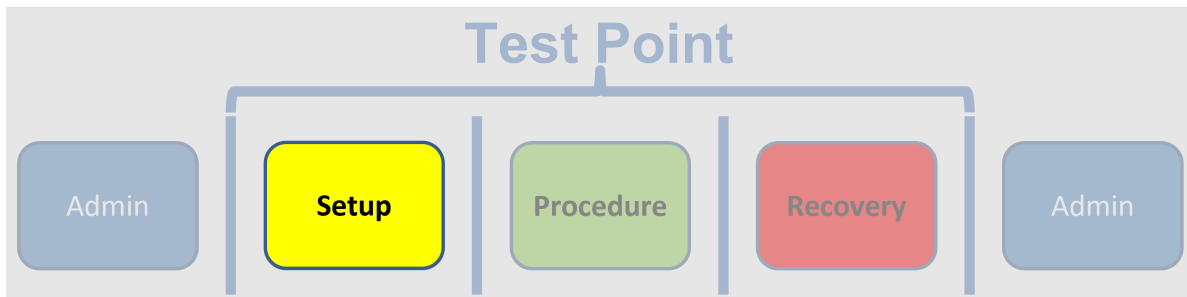


Figure D.4: Preparation for Test

The actions of the operator and the system that establish the conditions for a successful Procedure, including geometry, geography, system state, etc.

D.5 Recovery

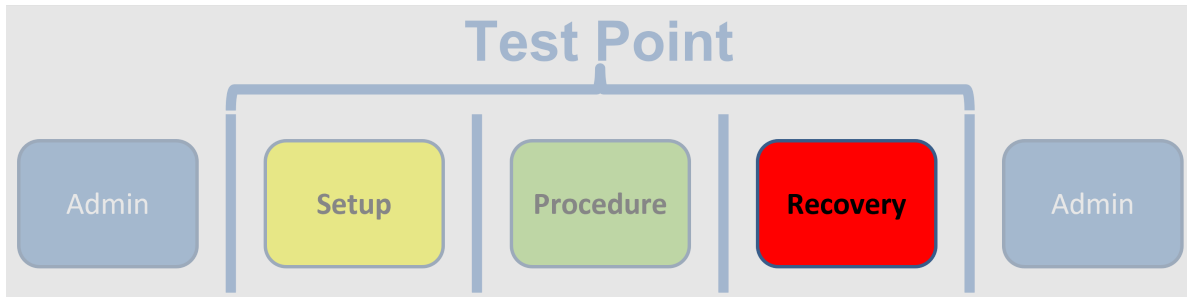


Figure D.5: Return to Normal Operations

The actions of the operator and the system that safely allow resumption of “normal” operations.

D.6 Admin

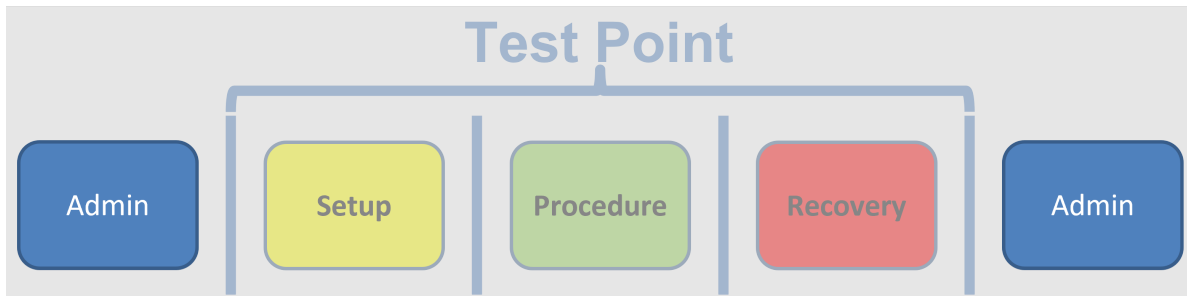


Figure D.6: A Change of State

The actions of the operator and the system before the test, between test points, or after the test.

D.7 Transitions

The gates from one critical phase to the next that establish the cadence of the test.

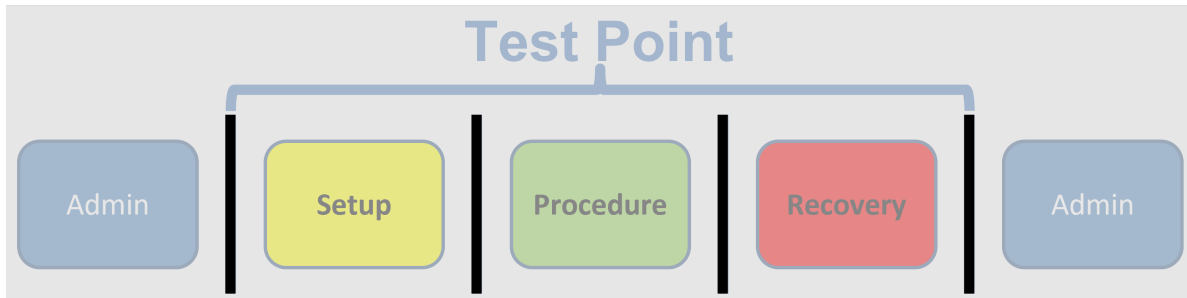


Figure D.7: “Pause” Points

D.8 The structure approach

For each test point, the test team

- **defines** the contents of each critical phase,
- **determines** entry and exit criteria through the transitions,
- **creates** a communications plan to support the transitions, and
- **creates** mission materials to assist in test conduct

D.9 Application to test card creation

Each test card reflects the critical phases of the test point under consideration.

Multiple test points can be put on a single page! The recovery/admin/setup phases between each point are explicitly included, instead of just a string of Procedure phases.

D.10 Application to Comm Plan



Figure D.8: Top to Bottom Test Point Flow on Test Card

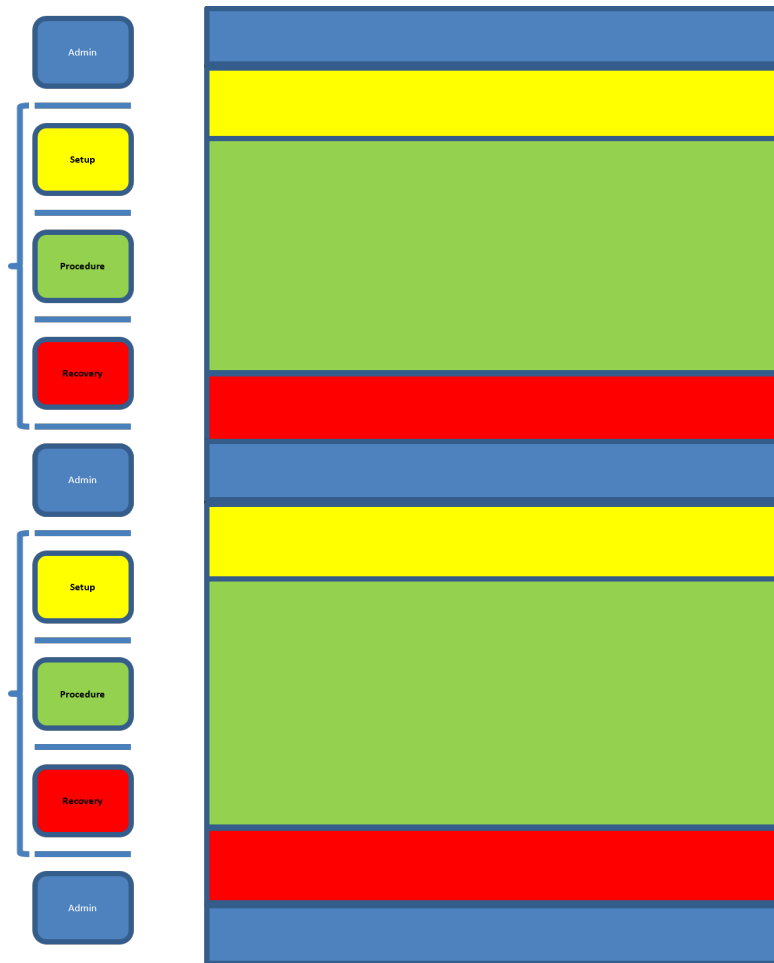


Figure D.9: Multiple Test Points on a Single Test Card

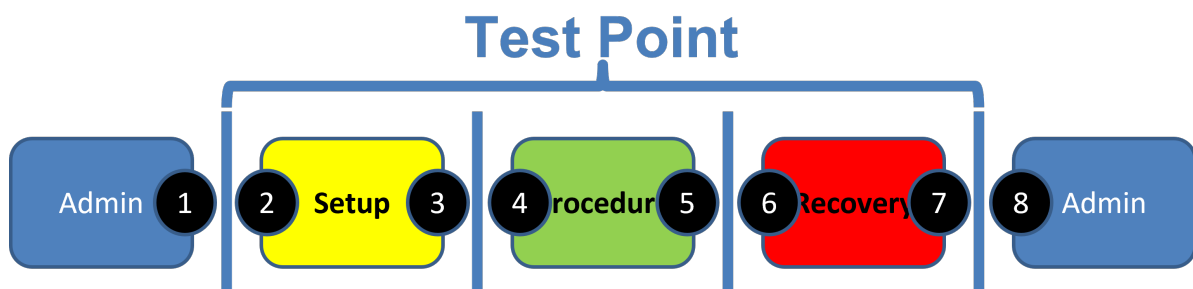


Figure D.10: Exit and Entry Criteria

1. Test: "Ready for next point"
2. Control: "Cleared to [condition/configuration]"
3. Test: "On conditions"
4. Control: "Cleared to maneuver"
5. Test or Control: "Maneuver complete/Recover(ing)"
6. Control: "Cleared to [condition/configuration]"
7. Test: "On conditions/Configuration complete/Recovered"
8. Control: "Point complete. Next point is X at Y"

- Odd = Exit
- Even = Entry
- The Key to Success:
 - The test team defines **the content and duration** of each critical phase and
 - identifies **exit and entry criteria** for the transitions between phases

E Communications Plan

E.1 Brevity...a small part of the comm plan

Part of the test conductor's responsibility is to establish and use a communications plan during test conduct.

The primary purpose of the comm plan is to create a “cadence” to the test flow, allowing the test team to anticipate the next step, then execute that step at the right time and right place with the right actions. If the comm plan is poorly briefed and/or understood, the execution of the test will suffer because of the difficulty of establishing an understanding of what is to be done, by whom, when and where.

Brevity can assist the comm plan by reducing the “chatter” on the radio, allowing the test team to focus on action, rather than communication.

Brevity is NOT the most important part of a comm plan, however!

Referring back to Table 1.1, you can see there is a priority order. Always remember that plain English (AKA “Trucker Comm”) is sometimes necessary to safely execute, but you should NEVER “talk around” classified over the radio.

E.2 Creating a comm plan

E.2.1 Defining your terms

Definitions are the foundation of a good comm plan. Test team members come from varied backgrounds. The mission materials and the pre-flight brief are the last opportunity to get everyone on the same page. A non-exhaustive listing of definition priorities is shown in Table 4.

Table E.1: Priority of Term Definitions

Terms	Examples	Priority
Emergency/Anomalies	Knock-It-Off Abort Terminate	Highest
Switch Actions	“Designate” v “TMS FWD”	High
Maneuvers	Success Criteria	High
Chase/Target Responsibilities	Safety v Photo v Area	High
Callsigns	“Test” v “Taco 01”	Medium
Plain English “Happy-to-Glad”	“Fly a normal pattern” v “Establish a normal pattern”	Low

E.2.2 Identifying the types of test points

Subdividing the test by types of test points provides the structure of a good comm plan. Some test missions consist of a single type of test point, necessitating a single, repeated comm plan. Other test missions have many types of test points, necessitating a carefully laid out comm plan, which clarifies which test point type is being flown for each test point.

E.2.3 Scripting the plan

A clear and common script is essential to ensure the test team has an objective reference for planning and briefing purposes. Include pacing when appropriate, for example during weapons deliveries pauses might be inserted into the countdown to allow for team members to call for aborts. Also consider the role of hot mic, which tends to reduce brevity on the part of the aircrew while the ground controllers are still constrained by radio communications, as well as reduced/partial comm situations, where portions of the test team cannot participate in the comm as briefed.

E.2.4 Brevity takes it from good to great

Keeping brevity in mind is the finishing touch of a good comm plan. Brevity takes a comm plan to the next level, but the foundation and structure are more important! So, when you get to the point of scripting your plan, only after defining your terms and identifying test point types, apply the three principles of brevity:

1. **Contracts** - At each step of the comm plan, know who is responsible for speaking next.
2. **Three Types** - Ensure your words accurately reflect whether the responsible party is:
 - a. Directing – “Cleared to...” “Check...”

- b. Informing – “Next point is...” “Point complete...”
 - c. Requesting – “Ops check...” “Confirm...”
3. **Standard Word Count** - Use words in accordance with the brief and the mission materials

E.3 Using the comm plan:

The key to establishing a cadence during test execution is consistency. Say the same thing at the same time to build test team confidence and to help reinforce the impression that the test mission is proceeding under control.

When inconsistencies creep in, they are a sign that something has changed. It may be as simple as fatigue, or it may be a serious system problem. Bring the test team back to the comm plan, if there are no safety-of-flight or test concerns. If there are problems to be resolved, be explicit about the plan of action and the exit criteria from the troubleshooting.

Example: “We are reviewing the data. If we can’t find the cause in the next 5 minutes, we’ll stop testing and return to base.”

Remember, you’re either using the comm plan, or you’re having a discussion. Both can be important aspects of test conduct. Make sure the entire test team is clear on where you are in your communications.