Flight Test Brevity

A Communications Guide

Nathan Cook

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Preface

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

- 2023-02-11
  - 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 A, 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 B 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.

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 Multiservice Codes Applicable to Flight Test

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

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 A.1: Attention-Getting Brevity Codes

Attention-Getting Brevity Code	Definition	Flight Test Context
ABORT	Directive call to cease action/attack/event/mission.	Per the comm plan, but typically used when test limits or boundaries have been or will be exceeded. Usually implies a briefed recovery procedure.
(system) BENT/SICK	System indicated is inoperative/degraded	Describing system difficulties
BINGO	Fuel state needed for recovery.	Briefed fuel state that triggers an automatic decision to terminate testing and RTB.
BLIND	No visual contact with friendly aircraft/ground position. Opposite of VISUAL.	Could be a test or a safety consideration.
BOGEY	A radar or visual air contact whose identity is unknown.	An indication of "stranger traffic" that could interfere with test execution.
DIVERT	Proceed to alternate mission/base.	Directing to alternate landing site for WX/MX/other

Attention-Getting Brevity Code	Definition	Flight Test Context
JOKER	Fuel state above BINGO at which separation/bugout/event termination should begin.	Briefed fuel state that indicates a decision point in the test flow. Can have multiple jokers for various reasons (tanker, altitude block change, etc.) as determined by test team.
KNOCK IT OFF	In training, a directive call to cease all air combat maneuvers/attacks/ activities/exercises.	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.
NO FACTOR	Not a threat.	Declaring that an identified aircraft will not interfere with safety of flight or test.
NO JOY	Aircrew does not have visual contact with the target/bandit/landmark. Opposite of TALLY.	Similar to BLIND, but BLIND is for friendlies; NO JOY is for everyone else.
PADLOCKED	Informative call indicating aircrew cannot take eyes off an aircraft, ground target, or surface position without risk of losing TALLY/VISUAL.	Indicates aircrew is task saturated and channelized.
(system) SOUR (mode)	Invalid/no response to an administrative IFF/SIF check. Opposite of SWEET.	Systems testing.
STRANGER	Unidentified traffic that is not a participant with the action in progress.	Traffic that could conflict with test execution or flight safety.
TALLY	Sighting of a target, non-friendly aircraft, or enemy position. Opposite of NO JOY.	Should cause a sigh of relief.

Attention-Getting Brevity Code	Definition	Flight Test Context
TERMINATE	1. Stop laser illumination of a target. 2. In training, cease local engagement without affecting the overall exercise.	Often used to cease test point execution. 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	Indicates • limited SA, • NO JOY, • BLIND and is a request for information.	HELP!!
VISUAL	Sighting of a friendly aircraft or ground position. Opposite of BLIND.	Could change required separations per the safety considerations.

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 A.2: Informative Geometry Brevity Codes

Informative Geometry Brevity Code	Definition
ANCHOR(ED) (location)	1. Directive call to orbit about a specific point. 2. Informative call to indicate a turning engagement at a specific location. 3. Refueling track flown by tanker.
FEET WET/DRY	Flying over water/land.
IN (direction)	1. Informative call indicating a turn toward a known threat. 2. Entering terminal phase of an air-to-ground attack. Opposite of OFF.

Informative Geometry Brevity Code	Definition
MARSHAL(ING)	Establish(ed) at a specific point.
OFF (direction)	Informative call indicating attack is terminated and maneuvering to the indicated direction.
ON STATION	Informative call that unit/aircraft has reached assigned station.
OUT (direction)	Informative call indicating a turn to a cold aspect relative to a known threat.
PUSHING	Departing designated point.
SADDLED	Informative call from wingman or element indicating the return to briefed formation position.
STRIPPED	Informative call that aircraft is out of prebriefed formation. Opposite of SADDLED.
WINGS LEVEL	Informative call from aircraft to FAC reporting rolled-out on final attack heading.

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 A.3: Relative Geometry Brevity Codes

Relative Geometry Brevity Code	Definition
BEAM (cardinal direction)	Contact stabilized within 70 to 110 degrees of aspect.
BRAA	1. Following information is in a tactical control format providing target bearing, range, altitude, and aspect, relative to the specified friendly aircraft. 2. Request/directive call to switch to tactical BRAA control format.
BULLSEYE	An established reference point from which the position of an object can be referenced. Extremely important! Ensure that the BULLSEYE is briefed. Typically paired with a bearing and range. "Bullseye 050 at 50 miles." Think polar coordinates with a briefed origin, instead of the Cartesian lat/long coordinates.
CLOSING	Decreasing in separation.

Relative Geometry Brevity Code	Definition
COLD	1. A descriptive/directive call to initiate a turn away from anticipated threats. 2. Defined area is not expected to receive fire (enemy or friendly). 3. Intercept geometry will result in a pass or roll out behind the target.
DRAG (cardinal direction)	Contact aspect stabilized at 0-60 degrees angle from tail or 120-180 degrees angle from nose.
FLANK (cardinal direction)	Contact aspect stabilized at 120 to 150 degrees angle from tail or 30 to 60 degrees angle from nose of aspect.
HOT	1. A descriptive/directive call to initiate a turn toward anticipated threats. 2. Defined area is expected to receive fire (enemy or friendly). 3. Ordnance employment intended or completed. 4. Contact aspect stabilized at 160-180 degrees angle from tail or 0 – 20 degrees angle from nose.
OPENING	Increasing in separation.
STACK	Two or more contacts or formations with an altitude separation in relation to each other.

"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 A.4: "Picture" Geometry Brevity Codes

"Picture" Geometry Brevity Code	Definition
PICTURE	A request to provide air information pertinent to the mission in a digital bullseye format.
NEW PICTURE	Used by controller or aircrew when tactical picture has changed. Supersedes all previous calls and re-establishes picture for all players.
CONTACT	1. Sensor contact at the stated position. Think "VISUAL" for points on the ground. 2. Acknowledges sighting of a specified reference point. 3. Individual radar return within a GROUP or ARM.

"Picture" Geometry Brevity Code	Definition
GROUP	Any number of air contacts within 3 NM in azimuth or range of each other.
PACKAGE	Geographically isolated collection of GROUPs.
ARM	Element resulting from target maneuvers exceeding GROUP criteria.
2 Groups	
AZIMUTH	A picture label describing two GROUPs separated laterally.
ECHELON (direction)	Picture label/fill-in describing two GROUPs with one group displaced behind and to the side of the other group.
RANGE	A picture label describing two GROUPs separated in distance along the same line of bearing.
3+ Groups	
BOX	A picture label describing four distinct GROUPs with two in front and two behind in a square or offset square orientation.
CHAMPAGNE	A picture label describing three distinct GROUPs with two in front and one behind.
LADDER	A picture label describing three or more GROUPs separated in range.
VIC	A picture label describing three GROUPs with a single group closest in range and two trail groups separated in azimuth.
WALL	A picture label describing three or more GROUPs separated primarily in azimuth.
Separation	
DEEP	Descriptive term used to indicate separation between the nearest and farthest GROUPs in range in a relative formation, used to describe a LADDER, VIC, CHAMPAGNE, BOX.
STACK	Two or more contacts or formations with an altitude separation in relation to each other.
WEIGHTED (cardinal direction)	(USN/USMC) Descriptive term used for a multiple GROUP formation (WALL, LADDER, VIC, CHAMPAGNE) that is offset in one direction.
WIDE	Descriptive term used to indicate the separation between the farthest GROUPs in azimuth in a relative formation, use to describe a WALL, VIC, CHAMPAGNE, or BOX.
Inner	
CONTAINER	Inner GROUP formation with four contacts oriented in a square or offset square.
LEAD-TRAIL	Inner GROUP formation of two contacts separated in range.
LINE ABREAST	Inner GROUP formation of two or more contacts separated in azimuth.

"Picture" Geometry Brevity Code	Definition
NEAR-FAR	(USAF) Fighter term depicting a radar-apparent description of two or more contacts within a GROUP separated in range.
SIDE-SIDE	(USAF) Fighter term depicting a radar-apparent description of two or more contacts within a group separated in azimuth.
STINGER	Three-ship inner group formation with two lead contacts line abreast and the single in trail.
WEDGE	Three-ship inner group formation with a single contact closest in range and two trail contacts line abreast.
Maneuvers	
CROSSING	Descriptive term for when two GROUPs initially separated in azimuth decrease azimuth separation to pass each other.
MANEUVER (AZIMUTH/RANGE/ALTITUDE)	Informative call that specified GROUP is maneuvering in azimuth, range, and/or altitude.
MARSHAL(ING)	Establish(ed) at a specific point.
MERGE(D)	1. Information that friendlies and targets have arrived in the same visual arena. 2. Informative call indicating radar returns have come together.
PASSING	Descriptive term for when two GROUPs initially separated in range, decrease range separation and pass each other.
SWITCHED	Indicates an attacker is changing from one aircraft to another.
TRACK (cardinal direction)	Group/contact's direction of flight.

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 A.5: Maneuver Brevity Codes

Maneuver Brevity Code	Definition
BANZAI	Informative/directive call to execute launch and decide tactics. 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)	Directive call to maneuver to a position on opposing sides, either laterally or vertically from the target.

Maneuver Brevity Code	Definition
BUSTER	Directive call to fly at maximum continuous speed (military power).
CRANK (direction)	F-Pole maneuver in the direction indicated; implies illuminating target at radar GIMBAL limits.
EXTEND(ING) (direction)	Short-term maneuver to gain energy, distance, or separation, normally with the intent of reengaging.
GATE	Directive/informative call to fly as quickly as possible, using after-burner/max power.
HOT	1. A descriptive/directive call to initiate a turn toward anticipated threats. 2. Defined area is expected to receive fire (enemy or friendly). 3. Ordnance employment intended or completed. 4. Contact aspect stabilized at 160-180 degrees angle from tail or 0 – 20 degrees angle from nose.
JINK	Directive call to perform an unpredictable maneuver to negate a tracking solution.
LEAN (direction)	Directive/informative call to maneuver in a direction to avoid the threat.
NOTCH(ING) direction)	Directive/informative call that an aircraft is in a defensive position and maneuvering with reference to an air-to-air threat.
OFFSET (direction)	Directive/informative call indicating maneuver in a specified direction with reference to the target.
PUMP	A briefed maneuver to minimize closure on the threat or geographical boundary with the intent to re-engage.
SHORT SKATE	(USAF) Informative or directive call to execute launch-and-leave tactics and be out no later than MAR/DR. Launch your missiles, then turn away to fight another day prior to a briefed distance from the target.
SKATE	Informative or directive call to execute launch-and-leave tactics. Launch your missiles, then turn away to fight another day. Turning at a distance closer than short skate to support your missile for longer.
STERN	Request for, or directive to, intercept using STERN geometry.
Turns	
CHECK (number, LEFT/RIGHT)	Turn (number) degrees left or right and maintain new heading.

Maneuver Brevity Code	Definition
COMEOFF (direction)	1. Directive call to maneuver as indicated to either regain mutual support or to deconflict flight paths. Implies both VISUAL and TALLY. 2. Directive call to maneuver or execute a specific instruction (e.g., COMEOFF DRY).
HARD (direction)	High-G, energy sustaining 180 degree turn (or as directed) in the indicated direction.
HOOK (LEFT/RIGHT)	Directive call to perform an in-place 180 degree turn.
IN PLACE (direction)	Perform indicated maneuver simultaneously.
PITCH/PITCHBACK (LEFT/RIGHT)	Directive call for fighter or flight to execute a nose-high heading reversal.
SLICE/SLICEBACK (LEFT/RIGHT)	Directive call to perform a high-G descending turn in the stated direction, usually 180 degree turn.
Non-Engagement	
FLOAT	Directive/informative call to expand the formation laterally within visual limits to maintain radar contact or prepare for a defensive response.
FLOW (direction)	Directive call to fly stated heading.
MARSHAL(ING)	Establish(ed) at a specific point.
POP	1. Starting climb for A/S attack. 2. Max performance climb out of low-altitude structure.
POST HOLE	Rapid descending spiral.
SHACKLE	One weave, a single crossing of flight paths; maneuver to adjust or regain formation parameters.
SPIN	Directive or informative call to execute a timing/spacing maneuver.
SPLIT	Informative/directive call that flight member is leaving formation to pursue a separate attack; VISUAL may not be maintained.

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.

ASPECT AND RELATIVE GEOMETRY BREVITY CODES*

R(IGHT)

| 18AA | H(EAD) | TARGET | T(AIL) | 00AA |

HOT

COLD

L(EFT)

16AA

02AA

15AA

FLANK

DRAG

09AA

12AA

06AA

11AA   07AA

BEAM

*US Navy has reverse convention, "Head" is 00, "Tail" is 18

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

Table A.6: Request Brevity Codes

Request Brevity Code	Definition
POSIT	Request for friendly position; response in terms of a geographic landmark or off a common reference point.
STATUS	1. Request for an individual's tactical situation. 2. (Group) Request for a full positional update in digital bullseye format on the specified group.
WHAT LUCK	Request for results of missions or tasks.
WORDS	Directive or interrogative call regarding further information or directives pertinent to the mission.

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.
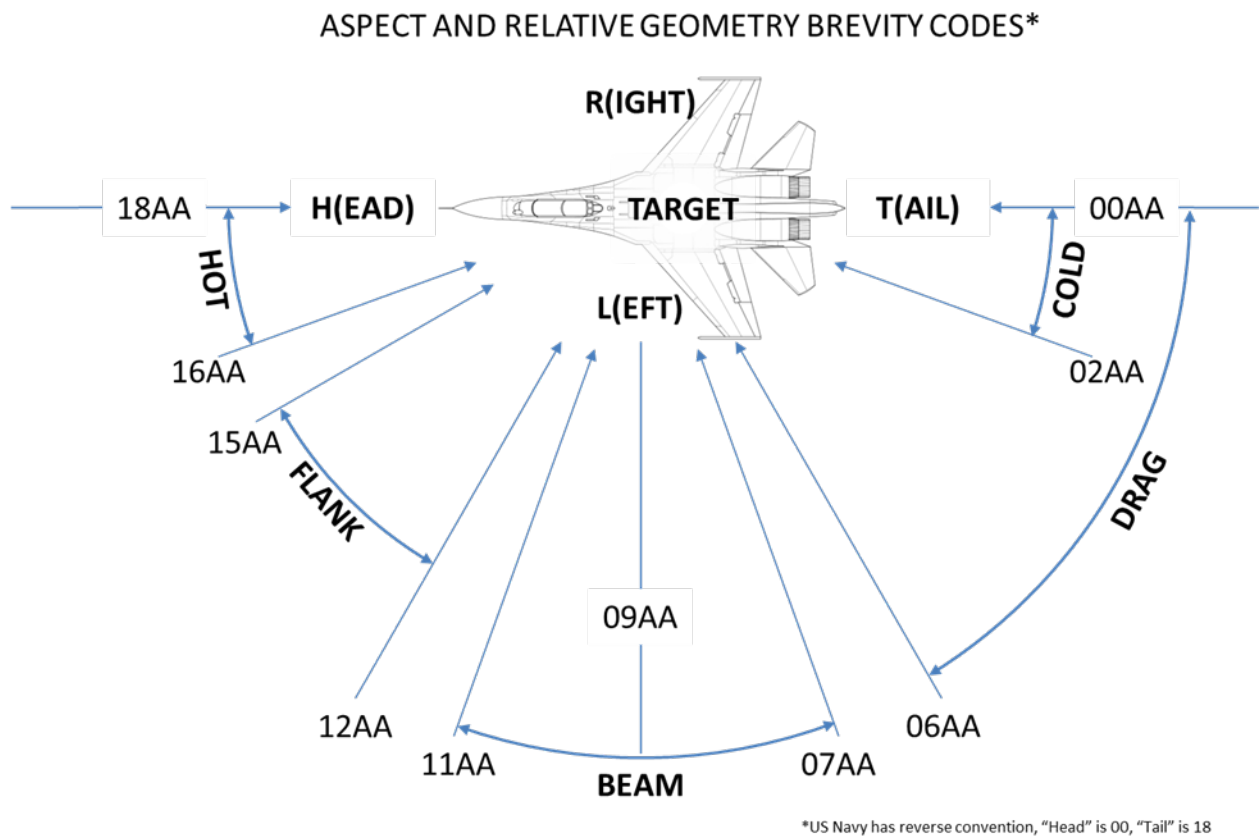
Table A.7: Weapon Brevity Codes

Weapon Brevity Code	Definition
(weapon) AWAY	Release/launch of specified weapon.
FOX (number)	Simulated/actual launch of air-to-air weapons. ONE - semiactive radar-guided missile. TWO - infrared-guided missile. THREE - active radar-guided missile.
GUNS	Reference to gun engagement.
MILLER TIME	1. (A-G) Informative call indicating completion of air-to-ground ordnance delivery. Generally used by the last striker in conjunction with a pre-coordinated egress plan. 2. (CSAR) Indicates survivor(s) are aboard recovery vehicle in Combat Search and Rescue.
PIG(S)	Friendly glide weapon (i.e., JSOW).
RIFLE	Friendly air-to-surface missile launch.
RIPPLE	Two or more munitions released or fired in close succession.
SHOOTER	Aircraft/unit designated to employ ordnance.
SHOTGUN	Briefed weapons state at which separation/bugout should begin.

Weapon Brevity Code	Definition
SPLASH(ED)	1. (A/A) Target destroyed. 2. (A/S) Weapons impact. 3. (S/S) Informative call to observer or spotter five seconds prior to estimated time of impact.
TARGET	1. Directive call to assign group responsibility. 2. (w/TAD/TIDS, etc.) Inter-flight directive to target via information displayed on data link system.
TARGETED	Informative call that GROUP responsibility has been met.
THUNDER	Informative call one minute prior to A/S weapons impact.
WHAT STATE (item)	Request for amount of fuel and missiles remaining. Ammunition and oxygen are reported only when specifically requested or critical. (Active) = number of active radar missiles remaining. (Radar) = number of semi-active radar missiles remaining. (Heat) = number of IR missiles remaining. (Fuel) = pounds of fuel or time remaining.
WINCHESTER	No ordnance remaining.
HARM AGM-88	
ARIZONA	No ARM ordnance remaining.
MAGNUM (system/location)	Launch of friendly antiradiation missile.
SLAPSHOT (type/bearing)	Directive call for an aircraft to immediately employ a best available HARM against a specified threat at the specified bearing.
SNIPER (type, location [range, bearing])	Directive call for an aircraft to employ a range-known HARM against a specified threat at the specified location.
WORKING	1. (system w/location) Platform gathering EOB on a designated emitter. 2. Platform executing EID on a specific aircraft/group to obtain identification necessary for BVR employment.
AMRAAM AIM-120	
CHEAPSHOT	AIM-120 missile data link terminated between high and medium PRF active.
FOX 3 (X) SHIP (formative description)	(USAF) Valid missile shot against (x) separate targets (assumes 1 missile per target).
FOX THREE/ SECOND FOX 3	(USAF) Simulated or actual launch of multiple active radar-guided missiles on the same target.
HUSKY	Informative call that the AIM-120 is at HPRF active range.
MADDOG	Visual AIM-120/AIM-54 launch.

Weapon Brevity Code	Definition
PITBULL	1. Informative call that the AIM-120 is at MPRF active range. 2. Informative call that the AIM-54 is at active range.
SKOSH	Aircraft is out of/or unable to employ active radar missiles.

RADAR/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 A.8: Radar or Sensor Brevity Codes

RADAR/Sensor Brevity Code	Definition
BROKE LOCK	Advisory call regarding loss of radar/IR lock-on.
BUDDY LOCK	Locked to a known friendly aircraft. Normally a response to a "SPIKED" or "BUDDY SPIKE" call. Usually for transit to/from range, but could be used during test.
BUDDY SPIKE (posit/heading/alt)	Friendly aircraft air-to-air indication on radar warning receiver (RWR). Usually for transit to/from range, but could be used during test.
CAPTURED	Aircrew has acquired and is able to track a specified air-to-ground (A/G) target with an on-board sensor.
CLEAN	1. No sensor information on non-friendly group of interest. 2. No visible battle damage. Battle Damage (BD) checks "Clean and Dry" means no damage and no leaking fluids. 3. Aircraft not carrying external stores. Aircraft configuration. Be careful and be specific. Better to state explicitly the required configuration than to just say "clean."

RADAR/Sensor Brevity Code	Definition
DROP(PING)	1. Directive/informative call to stop monitoring a specified emitter/target and resume search responsibilities. 2. Informative call that fighter has discontinued tracking responsibility. 3. Remove the emitter/target from tactical picture/track stores. 4. Directive call to remove a specific system or EOB category from search responsibilities.
EMPTY	No emitters of interest detected.
FADED	Radar contact is (temporarily) lost on nonfriendly air/surface contact and any positional information given is estimated.
GADGET	Radar or emitter equipment.
GIMBAL (direction)	Radar target is approaching azimuth or elevation limits.
HIT(S)	1 . Momentary radar return(s). 2. (A/A) Indicates approximate target altitude (e.g., GROUP BULLSEYE 360/10, HITS 15 thousand). 3. (A/G) Weapons impact within lethal distance.
LASER ON	Directive call to start laser designation.
LASING	Informative call indicating that the speaker is firing the laser.
LOCKED	1. (w/Group Label) Radar lock-on; SORT is not assumed. 2. (w/Position) Radar lock-on; correct targeting is not assumed.
MAPPING	Multifunction radar in an A/G mode.
MARK	1. Used when aircraft passes over pickup zone/landing zone (PZ/LZ) team. 2. Directive term to record the location of a ground point of interest.
MONITOR	Maintain radar awareness on specified group.
MUD (type/direction)	Informative call Indicating RWR ground threat displayed.
MUSIC	Radar electronic deceptive jamming.
NAILS (direction)	RWR indication of AI radar in search.
NAKED	No RWR indications.
NEGATIVE CONTACT	Sensor information on a friendly aircraft is lost. Termination of CONTACT, track plotting is not warranted.
RAYGUN (position/heading/altitude)	Indicating a radar lock-on to unknown aircraft. A request for a "BUDDY SPIKE" reply from friendly aircraft meeting these parameters.
SHIFT (direction)	Directive call to shift laser illumination.
SINGER (type/direction)	Informative call of RWR indication of SAM launch.

RADAR/Sensor Brevity Code	Definition
SNAPLOCK (BRAA)	Indicates fighter has obtained a radar contact inside briefed threat range with beam, flank, or hot/head aspect.
SNIFF (type)	Passive sensor indication of a radar emitter.
SPARKLE	1. Target marking by IR pointer. 2. Target marking by gunship/ FAC-A using incendiary rounds.
SPIKE(D) (direction)	RWR indication of an AI threat in track or launch.
SPOT	Acquisition of laser designation.
STROBE(S) (bearing)	Radar indication(s) of noise jamming.
TIED	Positive radar contact with element or aircraft.
TOY	HTS pods.

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 A.9: Avionics or Datalink Brevity Codes

Avionics/Datalink Brevity Code	Definition
(system) BENT	System indicated is inoperative.
(system) SICK	System indicated is degraded/partially operative.
(system) SILENT (time)	System will be unavailable for time indicated.
(system) WELL	System indicated is fully operative.
(system) SOUR (mode)	Invalid/no response to an administrative IFF/SIF check. Opposite of SWEET.
(system) SWEET	Valid response to an administrative IFF/SIF check request. Opposite of SOUR.
Systems	
GADGET	Radar or emitter equipment.
PARROT	IFF/SIF transponder.
TIMBER	Air control NPG of Link 16/TADIL J. Datalink testing, especially "TIMBER SWEET" or "TIMBER SOUR"
TOY	HTS pods.
UNIFORM	UHF radio.
VICTOR	VHF radio.

Avionics/Datalink Brevity Code	Definition
PRIME/PRI	Primary radio frequency. UHF if UHF/VHF. UHF1 if UHF1/UHF2.
AUX	Auxiliary radio frequency. VHF if UHF/VHF. UHF2 if UHF1/UHF2
Directives	
FENCE (IN/OUT)	Set cockpit switches as appropriate before entering/exiting the combat area.
FLASH (system)	Temporarily activate specified system for identification purposes (IFF/afterburner/flare/chaff/etc.).
INTERROGATE	Interrogate the designated contact of the IFF mode indicated.
SQUAWK (mode/code)	Operate IFF/SIF as indicated or IFF/SIF is operating as indicated.
SQUAWKING (mode #)	An informative/descriptive call denoting a BOGEY is responding with an IFF/SIF mode or code other than that prescribed by the ATO/identification criteria.
STRANGLE (system)	Turn off equipment indicated. Example: "STRANGLE PARROT"
TOGGLE	Execute a briefed change of an avionics setting.
ZAP	Request for data link information.

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 A.10: Clearance Brevity Codes

Clearance Brevity Code	Definition	Flight Test Context
CLEAR(ED)	Response to requested action is authorized. No engaged/support roles are assumed.	**Test point** pacing ONLY. DO NOT SAY "CLEARED" WHEN A/C IS ABOUT TO TAXI, TAKE THE RUNWAY, OR LAND. 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!
CLEARED HOT	Ordnance release is authorized.	NOT FOR THE TEST CONDUCTOR TO SAY! Range control has the hammer.
CONTINUE	Continue present maneuver, does not imply a change in clearance to engage or expend ordnance.	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.
CONTINUE DRY	Ordnance release not authorized.	NOT FOR YOU TO SAY!
PRESS	Directive call to continue the attack; mutual support will be maintained. Supportive role will be assumed by the speaker.	Not typically used in flight test conduct, but a very common term in informal settings.
PUSH (channel)	Go 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	Proceed to a pre-briefed position or AO.	Start over, per the brief.

Clearance Brevity Code	Definition	Flight Test Context
RESUME	Resume last formation/route/mission ordered. If test point was paused, resume at last step.	
ROGER	Indicates the receipt of radio transmission; 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."
ROLEX (+/- Time)	Time line adjustment in minutes always referenced from original preplanned mission execution time. Plus means later; minus means earlier.	Often used when delays have offset brief mission times.
SAUNTER	Fly at best endurance.	Used when test is on hold.
SKIP IT	Veto of fighter COMMIT, usually followed with further directions.	Used to veto aircrew suggestion or to tell aircrew NOT TO PICKLE.
UNABLE	Cannot comply as requested or directed.	Used to indicate inability to comply.
WEAPONS ( ) • FREE • TIGHT • HOLD (USAF, USA,USMC) SAFE (USN)	Fire only: • At targets not identified as friendly IAW current ROE. • At targets positively identified as hostile IAW current ROE. • In self-defense or in response to a formal order.	Weapons testing.

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 A.11: Flight Condition Brevity Codes

Flight Condition Brevity Code	Definition
VERY FAST	Target speed greater than 900 knots ground speed or Mach 1.5.
FAST	Target speed is estimated to be 600 – 900 knots ground speed or Mach 1.0 – 1.5 .
SLOW	Contact with ground speed of less than 300 knots.
VERY HIGH	Target above 40,000 ft MSL.
HIGH	Contact is between 25,000 and 40,000 ft MSL.
MEDIUM	Contact altitude between 10,000 ft MSL and 25,000 ft MSL.
LOW	Contact altitude below 10,000 ft MSL.
WEEDS	Indicates that aircraft are operating close to the surface.

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 A.12: Rules of Engagement & ID Brevity Codes

ROE & ID Brevity Code	Definition
Discussion	
DECLARE	Inquiry as to the identification of a specified track(s), target(s), or correlated GROUP.
ID	1. Directive call to identify the target. 2. Informative call that identification is accomplished, followed by type.
Descriptions	
BANDIT	An aircraft identified as an enemy in accordance with (IAW) theater ID criteria. The term does not necessarily imply direction or authority to engage.
BOGEY	A radar or visual air contact whose identity is unknown.
CHICKS	Friendly aircraft, typically used for aircraft on the tanker.
FRIENDLY	A positively identified friendly aircraft, ship, or ground position.
HOSTILE	A contact identified as enemy upon which clearance to fire is authorized in accordance with theater rules of engagement.

ROE & ID Brevity Code	Definition
OUTLAW	Informative call that a BOGEY has met point of origin criteria for ROE. Point of Origin means that the contact came from a geographic location identified as hostile.
PAINT(S)	An interrogated group/radar contact that is responding with any of the specified IFF/SIF modes and correct codes established for the ID criteria.
PRINT (type)	Active NCTR reply.
SPADES	An interrogated group/radar contact which lacks all of the ATO (or equivalent) IFF/SIF modes and codes required for the ID criteria.

B 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.

B.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]?

B.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.

B.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."

B.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]"

B.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"

B.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

Convoluted verbiage

Effects of Error

Confusion

Plain English Antidote

"Is the [THING] in [STATE]?"

B.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."

B.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"

B.9 NEGATIVE

Correct Usage

"NEGATIVE"

Meaning

No

Typical Errors

See "AFFIRM"

Effects of Errors

See "AFFIRM"

Plain English Antidotes

"No"

B.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."

B.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.""

B.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."

B.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."

B.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)

B.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.

B.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.

B.16 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.

B.16.1 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.

B.17 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.

B.18 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."

B.19 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]"

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 subsituted.

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.

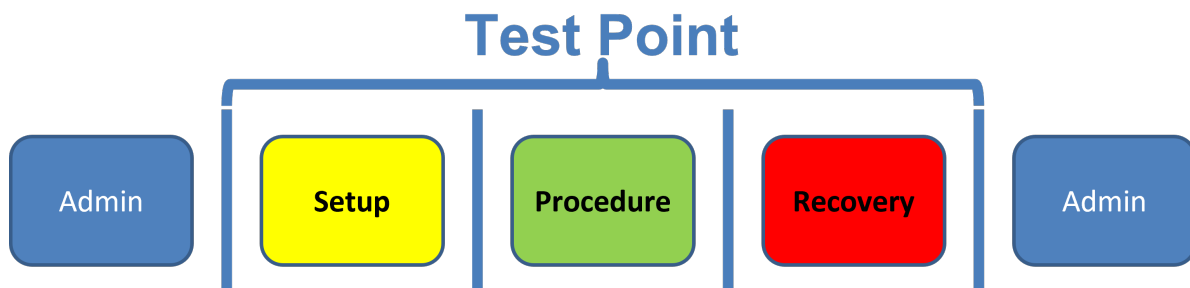Which begs the question, what ARE the "critical phases of a test point"?

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.
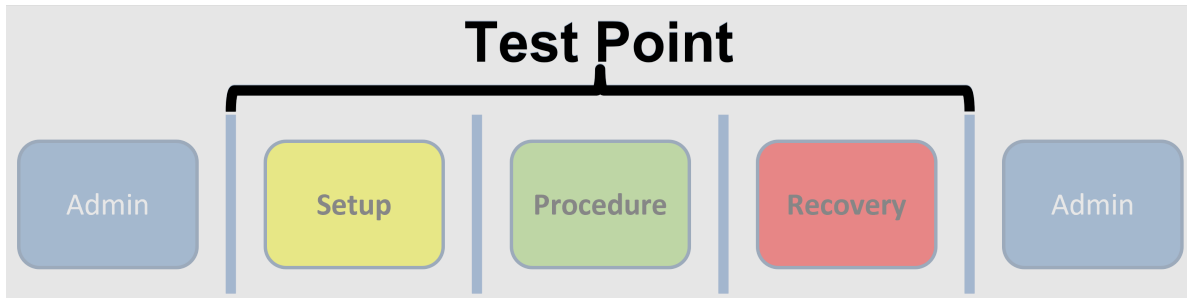
Figure D.2: A Quantum of Test
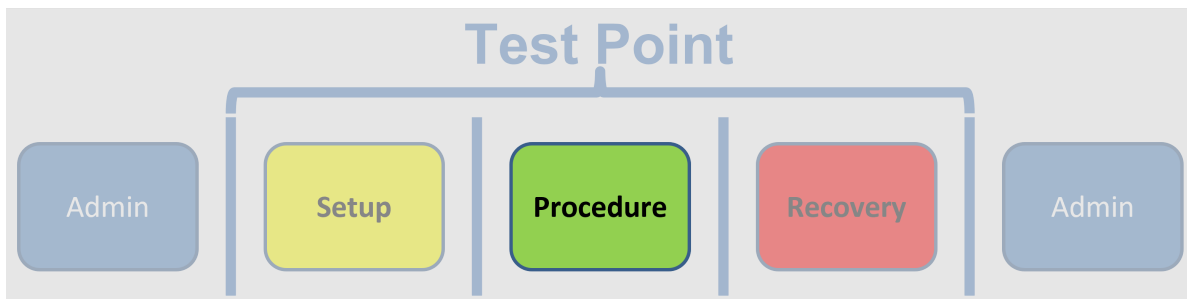
Figure D.3: Where The Data Live

D.3 Procedure

The actions of the operator and the system that generate data to support a test objective
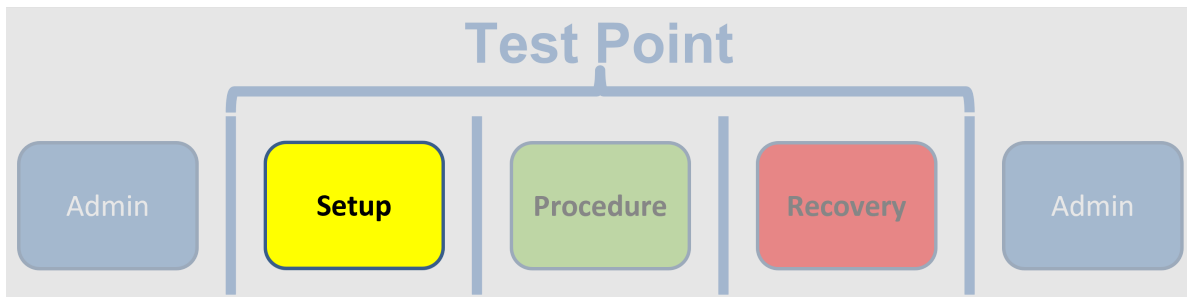
D.4 Setup

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.
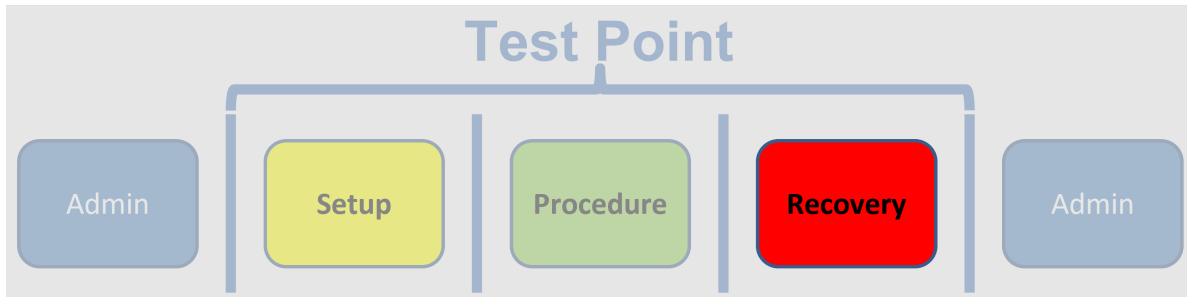
D.5 Recovery

Figure D.5: Return to Normal Operations

The actions of the operator and the system that safely allow resumption of "normal" operations.
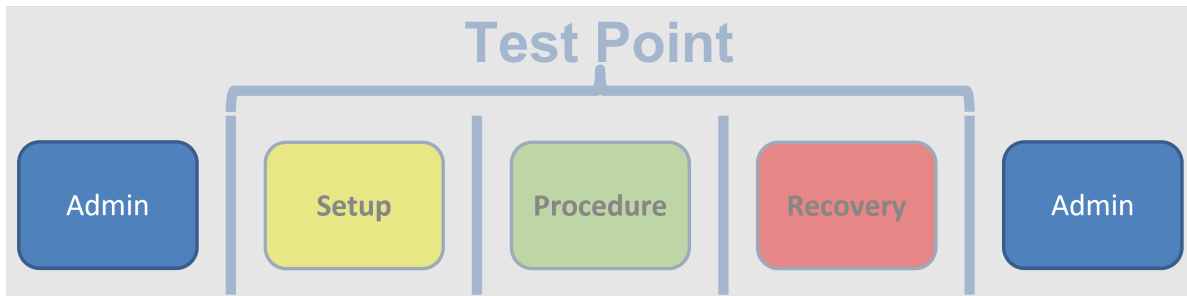
D.6 Admin

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.
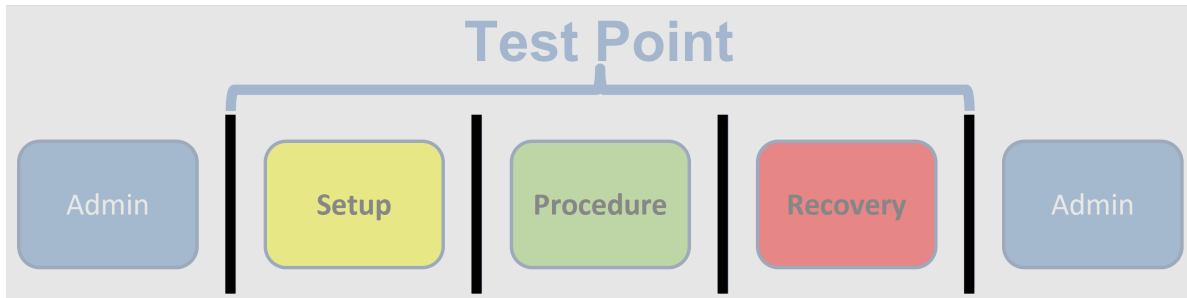
Figure D.7: "Pause" Points

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

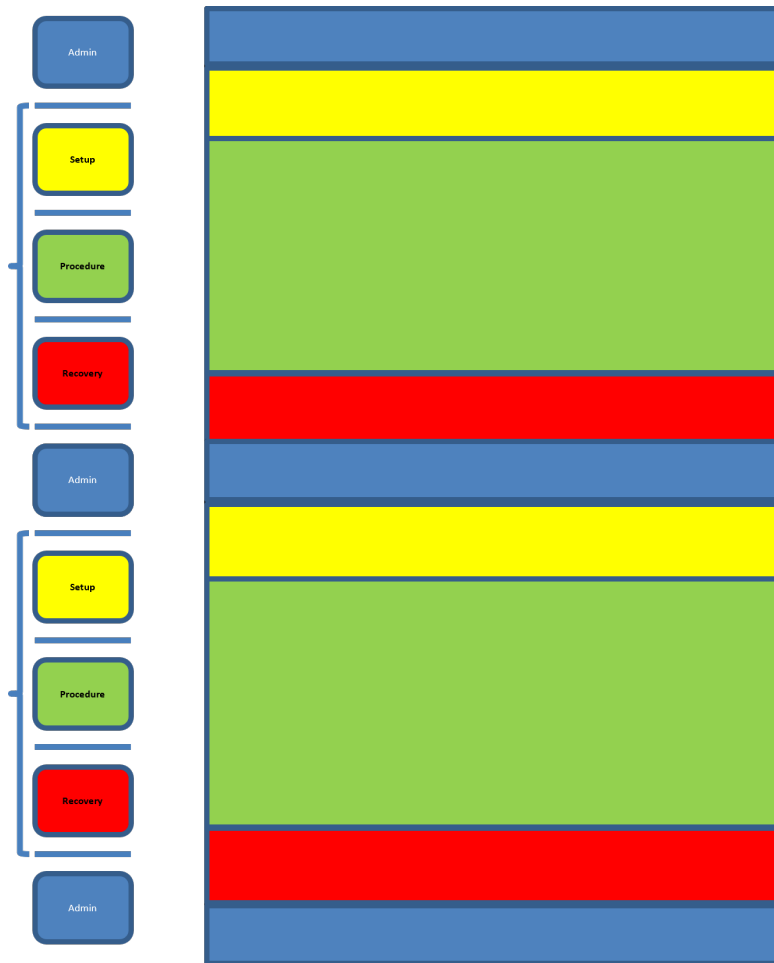Figure D.8: Top to Bottom Test Point Flow on Test Card
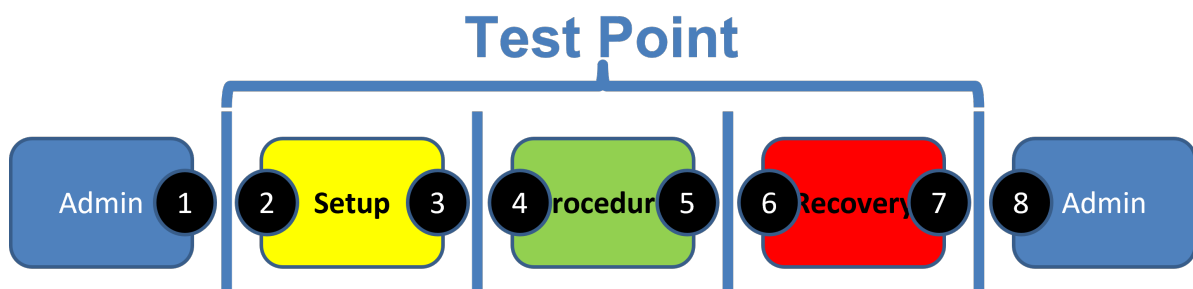
Figure D.9: Multiple Test Points on a Single Test Card

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	Highest
	Abort	
	Terminate	
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	Low
	"Establish a normal pattern"	

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.