

March 2026

Rev 1.2

# STTNG LX-9



**This is an unofficial update for LX-7 (Special-Speech version)**

**Not authorized by Williams!**

**The use of modified software outside of PinMAME  
is not intended  
and done at your own risk!**

**DO NOT LED-PATCH THIS ROM!**

A Non-Ghosting patch is already included and is enabled by default.

It can be disabled via Adjustment [A.2 36 LED PATCH](#).

**COUNTRY SETTINGS**

Country settings / DIP switches on the MPU are ignored.

For details please read [9.1 Country Settings](#)

**FIRST LX-9 BOOT TRIGGERS FACTORY RESET**

All your LX-7 and LX-8 high scores will be lost.



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# 1 Overview

This revised software for Star Trek The Next Generation (dubbed LX-9) is the second part of a very carefully executed, complete overhaul of the LX-7 version. The goal was to eliminate bugs and inconsistencies, add missing features and polish the overall game experience. Everything was designed to maintain the spirit of the original game and many optional changes can be disabled in the service menu - but if you like LX-7 you are certainly going to love LX-9.

With LX-9, the cannon shooting lag has been eliminated, resulting in a more responsive shooting experience. And along with LX-9 comes support for the newly developed STTNG Subway Mod, which significantly enhances subway ball handling and detection. Balls are returned to the playfield noticeably faster, and even slow shots into the Neutral Zone are always correctly recognized and no longer mistakenly counted as Left Hole or Command Decision shots. For details, please read section 14 STTNG Subway Mod.

The high score logic has been rewritten and is finally fixed. Details can be found in 5.17 High Scores. Also quite a few lighting and audio problems have been identified and are now corrected. See 4 Bugs Fixed In LX-9 and 5 Changes and Improvements in LX-9 for details.

The skill shot timer has been shortened and a four second ball save has been added to the Kickback to deal with failed Kickback attempts. You can revert to the old behavior via adjustments A.2 31 SKILL SHOT TIMER and A.2 54 KICKBACK.FAIL RTD.

A.2 60 DYNAMIC VOLUME is a nice new feature that raises the volume gently during Borg multiballs, Final Frontier and Warp 9 and it's enabled by default. But again, if you don't like it, it can be adjusted or completely disabled.

Of course there are also additions to the game logic. Please check out A.2 43 FERENGI MK II, A.2 45 CARDASSIA RTD TIME and A.2 48 ROMULAN MK II. For pinball wizards and long time owners adjustments have been added to make the game more challenging: with A.2 58 MISSION ARTIFACT artifact collection can be set to 'REQUIRED' and individual extra balls can be disabled with A.2 55 – 57.

If you are a tournament player, besides A.2 58 MISSION ARTIFACT there are other noteworthy changes: the NZ Encounters are now equalized if tournament play is enabled - that means player 1 gets a random NZ starting mission which is then also used for player 2, 3 and 4. Additionally the Launch-A-Probe bonus

has been fixed (see 4.9 Launch-Probe And Skill-Shot Awards In Tournament Play) and if you want to disable the physical Borg Lock you can do so with adjustment A.2 59 LOCK IN SHIP.

Last but not least, you have a random Shuttle Simulation, Launch Probe and Skill Shot are both good ball-start options again. Default settings, including “percentage calculations” (see A.2 35 PERCNT.ADJ.HOME.USE), have been optimized for home use. Also, the NZ Lock insert is lit differently than with LX-7 - details are described in A.2 30 SHOW NZ LOCK.

## 1.1 New Adjustments - Overview

	<b>For LX-7 choose</b>	<b>Default in LX-9</b>
A.2 27 POKER NIGHT	ON	TRIGGER.ONLY
A.2 29 RANDOM CAVES	OFF	ON
A.2 30 SHOW NZ LOCK	LATE / LX-7	EARLY
A.2 31 SKILL SHOT TIMER	NORMAL	SHORT
A.2 32 BALLSTART FLIPS	ON	OFF
A.2 33 RTD KCKBCK SAVER	OFF	ON
A.2 34 HURRY.UP PROX.ONLY	OFF	ON
A.2 35 PRCNT.ADJ.HOME.USE	OFF	ON
A.2 36 LED PATCH	OFF	ON
A.2 37 BORG.MB RTD TIMER	6s	6s
A.2 38 LITE EB LIMITS	OFF	ON
A.2 39 BORG.LOCK ROLLBACK	N.F / LX-7	FIXED
A.2 40 ADV POWER SAVER	OFF	OFF
A.2 41 SHIELDS OFF WHEN DOWN	OFF	ON
A.2 42 PARTY ANIMALS	OFF	20%
A.2 43 FERENGI MK II	OFF	ON
A.2 44 NZ SUBWAY HANDLING	LX-7	SHORT + RBP
A.2 45 CARDASSIA RTD TIME	OFF	10s
A.2 46 SAY NO TO DRUGS	ON	OFF
A.2 47 SP. SPEECH POST-GAME	ON/OFF	OFF
A.2 48 ROMULAN MK II	OFF	ON
A.2 49 WARP 9.9 ARTIFACT	OFF	ON
A.2 50 ALTERNATING MILLIONS	OFF	ON
A.2 51 CANNONS AT BOOT	ON	OFF
A.2 52 CANNON TURNS	1	1
A.2 53 MORE PHASERS	OFF	ON
A.2 54 KICKBACK FAIL RTD	OFF	ON
A.2 55 8X MULTIPLIER EXTRA BALL	8x/10x	10x
A.2 56 WARP 8 EXTRA BALL	ON	ON
A.2 57 BETA RAMP EXTRA BALL	ON	ON
A.2 58 MISSION ARTIFACT	OPTIONAL	OPTIONAL
A.2 59 LOCK IN SHIP	ON	ON
A.2 60 DYNAMIC VOLUME	OFF	2

## 1.2 Changed Adjustment Ranges

### A.1 STANDARD ADJUSTMENTS

	LX-7		LX-9	
	Min	Max	Min	Max
A.1 09 REPLAY LEVEL 1	1 million	5 billion	1 million	9.9 billion
A.1 10 REPLAY LEVEL 2	OFF	1.5 billion	OFF	9.9 billion
A.1 11 REPLAY LEVEL 3	OFF	1.3 billion	OFF	9.9 billion
A.1 12 REPLAY LEVEL 4	OFF	1.2 billion	OFF	9.9 billion

### A.2 FEATURE ADJUSTMENTS

	LX-7		LX-9	
	Min	Max	Min	Max
A.2 02 EXTRABALL PERCENT	OFF	35 %	OFF	100 %
A.2 06 MULTIBALL PERCENT	10 %	50 %	OFF	50 %
A.2 08 FERENGI TIME	8s	20s	8s	90s
A.2 12 RETURN TO DUTY	OFF	ON	OFF	30s

## 1.3 Changed Factory Defaults

	LX-7	LX-9
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### A.1 STANDARD ADJUSTMENTS

A.1 05	REPLAY SYSTEM	AUTO%	FIXED
A.1 09	REPLAY LEVEL 1	450 000 000	1 000 000 000 <sup>1</sup>
A.1 13	REPLAY BOOST	50 000 000	OFF <sup>2</sup>
A.1 14	REPLAY AWARD	CREDIT	AUDIT
A.1 28	MIN. VOL. OVERRIDE	NO	YES
A.1 29	GI POWER SAVER	15 Minutes	2 Minutes
A.1 32	NO BONUS FLIPS	NO	YES
A.1 33	RE-START → SOFT RESET in LX-9 <sup>3</sup>	SLOW	SLOW

### A.2 FEATURE ADJUSTMENTS

A.2 01	SPECIAL PERCENT	3 %	OFF
A.2 02	EXTRABALL PERCENT	20 %	25 % <sup>4</sup>
A.2 06	MULTIBALL PERCENT	20 %	12 % <sup>3</sup>
A.2 11	BUY-IN COUNT	3	1
A.2 12	RETURN TO DUTY	ON [4 secs]	8 secs

### A.3 PRICING ADJUSTMENTS

A.3 17	FREE PLAY	NO	YES
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### A.4 H.S.T.D. ADJUSTMENTS

A.4 09	H.S. RESET EVERY	3000	OFF
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1 Only relevant if REPLAY AWARD is not set to AUDIT, e.g. if ADD-A-BALL was chosen.

2 Only relevant if FREE PLAY is disabled.

3 The whole feature was rewritten. The default is the same.

4 Which corresponds to the LX-7 value if A.2 35 PERCNT.ADJ.HOME.USE is enabled.



## 2 Adjustments

### A.1 33 SOFT RESET

If a game is in progress, holding down the START button can be used to end the current game.

- **SLOW** (default)

A long press of the START button while a game is running resets the machine and ends the current game.

- **NEVER**

Disable soft resets via the START button.

### A.2 25 RE-START AFTER WARP

- **CLASSIC**

This is the default LX-7 behavior: After playing Warp 9, the warp factor resets to 1, Skill Selection starts at Warp 2, and the Delta Ramp no longer increases the warp factor.

- **FULL** (default)

Similar to *CLASSIC*, but after Warp 9, the Delta Ramp continues to increase the warp factor. And if you're below Warp 7, you may occasionally hear “The Picard Maneuver - nicely done” instead of the usual warp callout<sup>1</sup>.

- **OFF**

Once Warp 9 has been reached, that's it. No more increase in warp.

---

<sup>1</sup> Remark: Hitting the Left Orbit and then directly the Delta Ramp has always rewarded a “Picard Maneuver” and triggered the according call out. However, this call out has a lower priority than the Warp factor callout and was never played back.

## **A.2 26 SUPER SPINNER**

When Super Spinner is lit at Warp 6 the spinner award is increased to 10 millions for each turn.

- **ON** (default)
- **OFF**

## **A.2 27 POKER NIGHT**

- **CLASSIC**

To start Poker Night instead of Shuttle Simulation, you have to hold the trigger when pressing the left flipper button.

- **TRIGGER.ONLY (default)**

Start Poker Night instead of Shuttle Simulation by just pulling the trigger.

- **OFF**

Poker Night is disabled.

## **A.2 28 SPECIAL SPEECH**

Also known as “Silly Speech”. This is the original adjustment from the LX-7 Special-Speech version, but in LX-9 it only enables the silly callouts. There are three more callouts added with Special Speech LX-7 version that aren’t silly. These can be enabled seperately with adjustment **A.2 47 SPECIAL SPEECH POST GAME SHOW**.

- **ON**
- **OFF** (default)

## A.2 29 RANDOM CAVES

If you play STTNG on a regular basis, you are most probably a little bit bored by LX-7's static cave layout in Shuttle Simulation. Since LX-8, Shuttle Simulation is fun and challenging.

- **ON** (default)

At the end of each cave there's a 50% chance that the left and right exit of the cave are switched, resulting in a new, randomized cave system every time the simulation is activated.

- **OFF**

Stock LX-7 Shuttle Simulation with static cave system.

## A.2 30 SHOW NZ LOCK

The Neutral Zone always has a clearly defined state once a game is started, and it's either:

- Start Romulan Encounter
- Start Ferengi Encounter
- Start Cardassian Encounter or
- Lock a ball

but LX-7 wouldn't tell you until all three NZ Targets were lit. Since LX-8 that has changed.

- **EARLY** (default)

If the NZ is in the "lock state", the first lit NZ target will also light the NZ Lock Insert. So you will know that you can lock a ball **once all NZ targets are lit**. In other words, although the NZ Lock Insert may be lit early on, no ball will be locked until all NZ targets are lit.

- **LATE / LX7**

If the NZ is in "lock state", the Lock Insert will only turn on once all three NZ targets are lit. If the ball enters the subway immediately after hitting the third NZ target the ball will immediately be locked - but the NZ Lock Insert will never turn on.

For detailed information about NZ behavior in LX-7 please refer to [8.2 Neutral Zone Target- and Lock-Lighting Behavior](#).

### **A.2 31 SKILL SHOT TIMER**

Here you can adjust how much time you have to shoot the right ramp when selecting SKILL SHOT at ball start.

- **SHORT** (default)  
3 seconds. You only have one shot.
- **NORMAL**  
10 seconds. Stock LX-7 behavior.

### **A.2 32 BALLSTART FLIPS**

Like A1.32 “No-Bonus-Flips”, but for mode/skill-selection at ball start.

- **ON**  
Stock LX-7, flippers are active during mode selection.
- **OFF** (default)  
Flippers are deactivated during mode selection.

### **A.2 33 RTD KCKBCK SAVER**

- **ON** (default)  
While Return-To-Duty is active the Kickback Plunger will be used to bring the ball back to the playfield. Kickback state won't be changed.
- **OFF**  
Stock LX-7 behavior: Kickback is only used when lit and then deactivated, even while Return-To-Duty is active.

### **A.2 34 HURRY.UP PROX.ONLY**

In LX-7 if Hurry-up is lit, it is triggered by Made-Middle-Ramp (Alpha Ramp), Left-VUK-Ball-Kickout and by Left-Return-Lane (the proximity/

Eddy sensor). Most probably this was done to avoid trouble in case the proximity sensor is not working correctly on location. But it feels better to have Hurry-up started exactly when the ball rolls over the lit “Start Hurry-up” insert.

- **ON** (default)  
Hurry-up is only triggered by Left-Return-Lane.
- **OFF**  
LX-7 stock behavior. Made-Middle-Ramp, Left-VUK-Ball-Kickout and Left-Return-Lane trigger Hurry-up.

## **A.2 35 PERCNT.ADJ.HOME.USE**

In LX-7, Special Percent (A2.1) and ExtraBall Percent (A2.2) are meant to be set by the operator. The machine keeps track of the actual extra balls awarded and tries to meet the operator's settings by constantly adjusting the probability of random Special and extra ball awards that can be earned via Skill Shot and Launch-A-Probe (the random extra ball can also be found during shuttle simulation). A random extra ball is only given as first extra ball per game (once for each player). Special is only given once per game (no matter how many players) - and it's only given if Special Award is set to “credit”.

Multiball Percent is only checked every 240 games and is used to adjust the number of NZ encounters before a NZ lock is available (See 8.1 The State of the Neutral Zone). The Light Lock probability of Launch-A-Probe is fixed at 12%.

For home use it is more convenient to set fixed Skill Shot and Launch-A-Probe probabilities instead of using a moving average, hence this new feature.

- **ON** (default)  
The percentage values set in the adjustments are used directly as probabilities for Skill Shot and Launch-A-Probe. They are not adjusted over time. The NZ lock offset is not adjusted at all and the NZ Lock will always be available after the first NZ encounter - like it is in LX-7 for the first 240 games after a factory reset. Multiball Percent can now be used to adjust the Light Lock probability of Launch-A-Probe.
- **OFF**  
LX-7 behavior for percentage adjustments.

## A.2 36 LED PATCH

- **ON** (default)  
Avoid ghosting by using modified lamp matrix code.
- **OFF**  
Stock LX-7 lamp matrix code.

## A.2 37 BORG.MB RTD TIMER

- **6 .. 30 secs** (default: 6s)  
Adjust duration of Borg Multiball ball saver. In LX-7 this period is hard coded to 6s.

## A.2 38 LITE EB RESPECTS EB LIMITS

Here you can enable that you don't want extra balls lit that can't be collected due to extra ball limits from [A.1 03 EB MAX COUNT](#) and [A.1 04 EB PER BIP](#).

- **ON** (default)  
The number of lit extra balls can't exceed the limits set by either [A.1 03 EB MAX COUNT](#) or the normally disabled [A.1 04 EB PER BIP](#). Collecting an extra ball in Battle- or Shuttle Simulation can also disable previously lit extra balls if one of the limits has been reached.
- **OFF**  
LX-7 behavior. You can light as many extra balls as you want, but you might not be able to collect them.

### **Remark:**

If you enable this and set [A1 04 EB PER BIP](#) limit, you should think about disabling [A.2 05 EXTRABALL MEMORY](#).

## **A.2 39 BORG.LOCK ROLLBCK**

With a steep playfield angle, balls shot up the Delta Ramp that reach the diverter but don't make it all the way to the Borg Lock can sometimes travel down the wire ramp and trigger a lock.

- **ON** (default)

If the Top Diverter wasn't activated and the ball goes down the wire ramp, the Made-Left-Ramp switch won't trigger a lock.

- **OFF**

LX-7 behavior: If Borg Lock is lit, the Made-Left-Ramp switch triggers a lock.

## **A.2 40 ADV POWER SAVER**

- **SHIELDS** (default)

If A.1 29 POWER SAVER is enabled, shields are turned off in attract mode - no matter what dimming level is set in A.1 30.

- **SHIELDS + PF**

If A.1 29 POWER SAVER is enabled, play-field GI and shields are turned off in attract mode, no matter what dimming level is set A.1 30. The dimming level is only used for the back box.

- **OFF**

LX-7 behavior. The dimming level set in A.1 30 is used for all GI (including shields).

## **A.2 41 SHIELDS OFF WHEN DOWN**

During gameplay, even when shields are down, the shield inserts were previously only dimmed to the lowest level. With LX-9, they are now turned off completely by default.

- **ON** (default)

Shield inserts are turned off when shields are down during Cardassia and Borg multiball.

- **OFF**

Normal LX-7 behavior: Shield inserts stay lit all the time and you must rely on the callouts to know if shields are down.

## **A.2 42 PARTY ANIMALS**

You can replace the DOHO limousine animation with the Party-Animals Easter egg with the set probability.

- **0 .. 50 %** (default: 20%)

## **A.2 43 FERENGI MK II**

- **ON** (default)

The Ferengi timer is paused and Neutral Zone inserts are disabled while four balls are in play. Additionally at Ferengi Multiball start a successfully cannon shot that goes into the subway awards two additional balls instead of just one.

- **OFF**

Classic LX-7 Ferengi Encounter.

## **A.2 44 NZ SUBWAY HANDLING**

The Neutral Zone and Left Hole share the same opto sensor in the subway. The software determines which entry point the ball came from by using timing logic: when an NZ (Neutral Zone) target is hit, a timer starts. If the ball then triggers the opto beneath the Left Hole, the software checks whether the NZ timer is still active. If it is, the shot is registered as a Neutral Zone hit. If not, it's handled as a Left Hole shot. The existing solution has its problems:

- A shorter NZ timer can cause Neutral Zone shots to be misclassified as Left Hole hits - if the ball doesn't reach the opto quickly enough.
- On the other hand, a longer timer may result in Left Hole shots being misclassified as NZ hits if the ball recently bounced off an NZ target before entering the hole.
- There can also be issues with fast balls entering the subway from the Neutral Zone. Occasionally, these balls can travel in the wrong

direction through the subway and trigger the “Under Top Hole” opto, which may start Shuttle Simulations or register unintended locks. This can be influenced by factors like a freshly waxed playfield that adds extra spin to the ball. To address this, LX-8 introduced a roll-back protection: when enabled, the Under Top Hole handler checks if the NZ was recently hit and ignores balls traveling through the subway in the wrong direction.

- Also slow balls that don’t trigger an NZ target are always recognized as Left Hole hits.

To get rid of the above described inconveniences there is a **hardware solution** available: **the STTNG Subway Mod** directly addresses the issues described above. It improves detection reliability, speeds up subway operation, and even registers slow balls that simply roll into the Neutral Zone without triggering a target. For details please check section 14 STTNG Subway Mod. If you have **A-17078-01** or **A-17078-01-CLF** installed, set Adjustment A.2 44 to “**MOD INST**”.

- **SHORT + RBP** (default)  
NZ target timer: 2 seconds, Roll-back protection: ON
- **LONG + RBP**  
NZ target timer: 3 seconds, Roll-back protection: ON
- **LX-7**  
NZ target timer: 3 seconds, Roll-back protection: OFF
- **MOD INST**  
NZ target timer: <1 second, Roll-back protection: OFF

## **A.2 45 CARDASSIA RTD TIME**

A ball saver. For Cardassia!

- **OFF .. 30s** (default: 10s)  
The time in seconds the ball saver is going to be active after Cardassia multiball has been started.

## A.2 46 SAY NO TO DRUGS

The “Say No to Drugs” attract mode animation is disabled by default in LX-9, but you can re-enable it here.

- **ON**  
The animation will play during attract mode.
- **OFF (default)**  
The animation is skipped.

## A.2 47 SPECIAL SPEECH POST GAME SHOW

The special speech version of LX-7 came with 3 new post game show callouts. These callouts are not silly (like the rest of the Special-Speech audio samples) and thus can be enabled separately.<sup>1</sup>

- **OFF (default)**  
The post game show only has one game-play dependent callout:
  - “Captain’s log supplemental: The crew performed admirably defending the Borg Threat”
- **ON**  
Three more callouts are added to the post game show:
  - “Captain’s log supplemental: Although we’ve made significant discoveries we must realize this can only be the beginning.”
  - “Captain’s log supplemental: Q’s latest visit proved a true test to the crew’s abilities.”
  - “Captain’s log supplemental: Our experience in the Final Frontier was most remarkable.”

### **Remark:**

Special Speech Audio ROMs are needed, otherwise you will just hear Search-The-Galaxy background music but no callout at all.

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<sup>1</sup> In the regular version of LX-7 you can already find the code that sets the according flags for the integration of those 3 callouts in the post game show code. However it seems neither the samples or the complete code made it into the production units.

## A.2 48 ROMULAN MK II

To make the Romulan Encounter a bit more entertaining, LX-9 does change the game logic by default. But if you find it a little bit too entertaining, it can be disabled here.

- **ON** (default)  
Increased scoring, an artifact at the end and Delta Ramp triggers double Klingon Assistance<sup>1</sup>.
- **OFF**  
LX-7 Romulan Encounter. No increased scoring. No artifact. No delta ramp.

## A.2 49 WARP 9.9 ARTIFACT

Reaching Warp 9.9 is definitely a pinball moment and deserves a grand finale. With LX-9, an artifact is added to the 60 million points you get when reaching Warp 9.9.

- **ON** (default)  
Reaching Warp 9.9 rewards you with 60 millions and an artifact.
- **OFF**  
LX-7 behavior. Reaching Warp 9.9 awards 60 million points.

## A.2 50 ALTERNATING MILLIONS

In LX-9 the Millions inserts light up one ramp at a time. If you want LX-7 behavior back, you can disable this feature here.

- **ON** (default)  
Alternating Alpha and Beta ramp shooting sequence. 5 Millions reward is skipped.
- **OFF**  
LX-7 behavior.

---

<sup>1</sup> Please make sure your Bird of Prey is installed correctly and ready to intercept the Romulan Warbird.

## A.2 51 CANNONS AT BOOT

When you power up the machine, most probably at least one of your cannons starts turning. This is a side effect of memory initialization at boot and the cannon operations code. Details can be found in [7 Cannon Operations](#).

- **ON**  
LX-7 behavior. Cannons fire (and probably start turning) at boot.
- **OFF (default)**  
During boot no cannon is fired and nothing turns.

## A.2 52 CANNON TURNS

This adjustment is for casual players, those with lasers installed or anyone who just enjoys the opportunity for a short break.

- **1 (default)**  
Cannons eject the ball if the trigger isn't pulled after one turn. Default LX-7 cannon behavior.
- **2**  
Cannons do two turns before the ball is ejected.

### **Remark:**

With “2” Cannon Turns you can only shoot the ball if the mark switch is open. Normally there is a timer that overrides the mark switch if it's not opening within a given amount of time. However, with two turns, the system relies entirely on properly adjusted mark switches.

## A.2 53 MORE PHASERS

- **ON (default)**  
Reduce wait time between attract mode phaser sounds from 3 minutes to 0.2 seconds.
- **OFF**  
LX-7 behavior. Wait 3 minutes between phaser sounds.

## **A.2 54 KICKBACK.FAIL RTD**

Fast-moving balls can sometimes be too quick for the Kickback mechanism, or they may head straight down the middle immediately after being saved by the Kickback.

- **ON** (default)  
For about as long as the Kickback insert is blinking (and no multiball is active), Return-To-Duty is silently activated to recover lost balls.
- **OFF**  
LX-7 behavior.

## **A.2 55 MULTIPLIER EXTRA BALL**

Here you can set when and whether the multiplier extra ball is awarded.

- **8x**
- **10x** (default)
- **OFF**  
Multiplier extra ball is disabled.

## **A.2 56 WARP 8 EXTRA BALL**

- **ON** (default)  
When reaching Warp 8 for the first time an extra ball is lit (LX-7 behavior).
- **OFF**  
Warp Factor 8 extra ball is disabled. You will get an artifact instead.

## A.2 57 BETA RAMP EXTRA BALL

- **ON** (default)  
Beta Ramp lights extra ball after 15 hits.
- **OFF**  
Extra ball from Beta Ramp is disabled.

## A.2 58 MISSION ARTIFACT

If you are reaching Final Frontier regularly or maybe even multiple times in a single game, then this adjustment is for you.

- **OPTIONAL** (default)  
Classic LX-7 behavior: Artifacts are optional. Missions count as completed once started, even if you immediately loose the ball or hit no targets.
- **REQUIRED**  
A mission counts as completed only if you collect its artifact.
- **REQUIRED POST FINAL FRONTIER**  
Before Final Frontier, mission artifacts are optional for mission completion. After reaching Final Frontier, they are required.

## A.2 59 LOCK IN SHIP

This adjustment controls whether the physical Borg Lock in the Borg ship is used during gameplay. Disabling it improves flow and makes competitive multiplayer games more balanced.

- **ON** (default)  
Classic LX-7 behavior. If Left Lock is lit and no ball is already inside the Borg ship, the diverter will not engage and the ball has to make it all the way up to the Borg ship.

- **OFF**

Disables the physical Borg Lock. Even when Lock is lit, balls get diverted onto the wireform, counting as locked, and immediately return to the playfield. Balls can only reach the Borg Ship during Borg Multiball.

## **A.2 60 DYNAMIC VOLUME**

This adjustment controls whether the volume is increased during Borg Multiball, Final Frontier, and Warp 9.

- **OFF**

Classic LX-7 behavior: No automatic volume changes during gameplay.

- **1 .. 4** (default: 2)

The volume is increased by the selected amount.

### **Remark:**

To make the volume increase blend smoothly, the “Send to Starfleet, we have engaged the Borg” callout is slightly delayed (<0.5s). The delay was carefully chosen to make the callout also fit in better with the music. So if you don’t like dynamic volume but actually this little delay you can try setting dynamic volume to “1”. If you prefer the classic experience without the callout delay, choose “OFF”.



## 3 Bugs Fixed in LX-8

### 3.1 Cannon-Reload Locks + Cannon-Reload Lights Lock

In LX-7, whenever the cannon operation needs another ball from the trough during gameplay (for instance at Ferengi Encounter start or if a ball is locked during Battle Simulation), the new ball from the catapult is either triggering a lock-is-lit or is being locked when entering the subway through the Top Hole.

#### Steps to reproduce:

- a) for Cannon-Reload-Locks bug: light Right Lock. For Cannon-Reload-Lights-Lock bug: proceed to (b).
- b) Finish one NZ Encounter.
- c) Hit NZ targets 3 times to light NZ Lock.
- d) Start Battle Simulation.
- e) Sink ball in NZ. It will be locked.
- f) New ball comes from shooter lane and will be locked when entering the subway if you haven't skipped step (a). If you did, then the ball from the shooter lane will light Right Lock when entering the subway.

### 3.2 Missing Time Rift Hit Counter Reset

The Time Rift hit counter should give you an artifact if it equals 4. Since it's only reset at boot in LX-7 this leads to weird behavior. For example if you hit 3 targets in your first game after boot and then start Time Rift again in another game, it gives you the artifact on the first hit. Then you would have to score 255 Time Rift hits to get another artifact. LX-8 resets the Time Rift counter at Time Rift start.

#### Steps to reproduce:

- a) Restart your STTNG.
- b) Start a game.
- c) Start Time Rift.
- d) Hit 3 Time Rift shots and let the ball drain.
- e) Let the next 2 balls drain too.
- f) Start a new game.

- g) Start Time Rift.
- h) First Time Rift shot is going to give you an artifact.

### **3.3 Romulans Interrupt Borg Multiball and Shuttle Simulation**

If the Romulan Encounter is running when you start Shuttle Simulation or Borg Multiball in LX-7, some effects of the Romulan Encounter continue running in the background: In Shuttle Simulation the Romulan flasher (the green one) stays on and the playfield, which should stay dark, might get lit after a few seconds.

In Borg Multiball, you might hear the Romulan background music again and also see Romulan Encounter animations on the DMD. That happens when Romulan timers trigger or you hit “Klingon Assistance” targets.

And if your Borg Multiball or Shuttle Simulation takes long enough, Romulan Encounter might time out in the background.

In LX-8 all these problems have been fixed.

#### **Steps to reproduce:**

- a) Light Holodeck by hitting the Beta Ramp 3 times.
- b) Play NZ Encounters until the Romulans join the game.
- c) Start Holodeck.
- d) Notice the flasher is still lit,
- e) and make sure you survive a few caves.
- f) Within 10-15s the playfield lights up although you are still on the Holodeck.

### **3.4 VUK Overload**

Sending balls during multiball into the subway overloads the VUK if you do 15+ consecutive shots.

#### **Steps to reproduce:**

- a) With the glass removed, start a new game, select light lock.
- b) Then directly lock a 2nd and a 3rd ball.
- c) Now do the shooting part and don't let a ball drain, it doesn't matter if you hit or miss.

- d) Once the multiball starts, you should start grabbing the balls directly from the left flipper and put them into the the Neutral Zone or the Center Shot as fast as you can.
- e) Do this 20 times.
- f) Then stop and wait for 4 balls from the left VUK and the other two should come out from the cannons.

### 3.5 Special Speech Callouts Not Disabled Completely

With LX-7, even if you have *A.2 28 SPECIAL SPEECH* disabled, some Special Speech callouts are being played anyway.

#### Steps to reproduce:

- a) Start a game with LX-7 Special Speech and Special Speech Audio ROMs but with *A.2 28 SPECIAL SPEECH* disabled.
- b) Throughout the game - but most prominently in Battle Simulation - you will hear Special Speech callouts like:
  - Excellent, Patrick!
  - Fantastic, Patrick!
  - Well done, Patrick!
  - Beyond believe, Patrick!

### 3.6 Unhandled NZ-Shots

There is a bug in the LX-7 Neutral Zone code. It happens when the NZ is in “lock state”<sup>1</sup> when starting Borg Multiball.

Because no NZ Locks are allowed after Borg Multiball has been played, there is a problem when NZ is in lock state when starting Borg Multiball: If you manage to activate all NZ targets during the multiball then it’s not an issue, because lighting the 3<sup>rd</sup> target is where LX-7 advances the NZ from “lock” to the next state. But if you do not hit the 3<sup>rd</sup> NZ target during multiball, NZ will remain in lock state once multiball has ended. Once all three targets are lit, the next ball going into the subway in the NZ will just advance the state of the NZ away from lock and come out of the left VUK while the NZ stays lit.

LX-8 checks if NZ is in lock state when Borg Multiball starts and advances the NZ state directly.

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<sup>1</sup> 8.1 The State of the Neutral Zone has more details about how the Neutral Zone works

**Steps to reproduce:**

- a) Start a game.
- b) Finish one NZ Encounter - NZ is now in “lock state”.
- c) Light all NZ targets to light the NZ Lock.
- d) Start a Borg Multiball without using the NZ Lock. And during that multiball don't shoot the NZ at all.
- e) After the Borg Multiball, shoot a ball into the lit NZ.
- f) It will come out of the left VUK, no action is triggered although the NZ was lit and still is.

### **3.7 Officer's Club Shown Even if Buy-Ins Are Disabled**

Officer's Club is the high score table for games with 2 or more buy-ins. If you disable buy-ins in LX-7 it's still going to show you the Officer's Club high score table in attract mode.

### **3.8 Replay Animation Shown Even if Replay Award Is Set to Audit**

LX-8 doesn't show the REPLAY animation if A.1 14 REPLAY AWARD is set to AUDIT. If there is no award there shouldn't be an animation.

### **3.9 Borg Ship Ejects Ball on 2<sup>nd</sup> Ball Locked in Subway**

When you lock the 2<sup>nd</sup> ball via Right Lock or Neutral Zone with a lit Borg Lock *and* a ball inside the Borg Ship, that ball gets kicked out of the Borg Ship. This usually only happens in a 2+ player game, but with Launch Probe you can sometimes light the Borg Lock even though a ball is already in there. So you might have seen this in single player games as well.

**Steps to reproduce:**

- a) Start a 2 player game.
- b) Select Skill Shot and shoot the ball onto the drop target to light Right and Borg Lock.
- c) Lock a ball inside the Borg Ship, the next one into the Right Lock. And let the ball drain.
- d) Now with Player 2, select Skill Shot and shoot the drop target again to light both locks.

- e) Shoot the Right Loop to lock 1st ball in the subway.
- f) Shoot the Right Loop to light the Right Lock again. And then again to lock a ball there.
- g) This 2nd lock will trigger the ball inside the Borg Ship to be kicked out. And another one is going to be released by the left VUK, so you end up with 2 balls on the playfield.

### **3.10 High Scores Above 9,999,999,990**

While the high score tables have been completely fixed with LX-9 at least the display of the high score lists in Attract Mode above 9,999,999,990 has been already fixed in LX-8.

### **3.11 Borg Multiball Music After Borg Multiball**

If you place a Center Shot within 1 or 2 seconds after Borg Multiball has ended, the hit is awarded with another Borg Jackpot. This is fun and of course was not changed. But in LX-7 the Borg background music was triggered again and then running until you start another mission. This has been fixed in LX-8.

### **3.12 Borg Lock Lit Before Final Frontier Is Unusable Afterwards**

The Borg Lock cannot be used after Final Frontier if it was lit before Final Frontier started. If you manage to get a ball into the Borg Ship it will be shot out immediately without triggering a lock event. This is fixed in LX-8.

#### **Steps to reproduce:**

- a) Start a game.
- b) Finish all regular missions.
- c) Before starting Final Frontier, make sure Borg Lock is lit.
- d) Start Final Frontier.
- e) Loose all balls but one.
- f) Hit the Delta Ramp. Borg Lock is lit but the ball is spit out of the Borg Ship and the Borg Lock remains lit.

### 3.13 Rescue Mission Not Always Ended Correctly

If you manage to rescue exactly 50 personnel and the last 5 with the transporter, the Rescue music keeps playing and the animation is still shown, only the count down is not running anymore. This is fixed in LX-8.

#### Steps to reproduce:

- a) Start Rescue mission.
- b) Only hit the center shot to activate the transporter.
- c) With the 10<sup>th</sup> hit, you are going to see what's described above, Rescue mission is done but animation and music is not ended correctly.

### 3.14 Rescue Mission Not Always Resumed Correctly

If you lock a ball or start Shuttle Simulation when all personnel is ready, Rescue animation and music are not resumed even though the mission is still running. This is fixed in LX-8.

#### Steps to reproduce:

- a) Make sure you have a lock lit.
- b) Start Rescue mission.
- c) Get "all personnel ready".
- d) Now lock the ball and after the ball locked animation, Rescue music and animation won't come back but the mission is still running.

### 3.15 Drop Target Handling Warp 4

When starting a ball with "Warp Factor 4", the state of the drop target is not initialized correctly. All other options initialize this variable correctly, but Warp Factor 4 does not. In a single player game, that's why the drop target stays down after preventing the ball from entering the subway even though neither Right Lock nor Holodeck is lit. In a 2+ player game, it's worse:

#### Steps to reproduce:

- a) Start a 2 player game.
- b) Player 1: Select "Skill Shot", and then shoot the Right Loop to light Borg and Right Lock.
- c) Let the ball drain.

- d) Player 2: select “Light Lock” (but anything except Warp-4 will work). Drop target is up as it should be (since neither Holodeck nor Right Lock is lit). Then wait a little to let RTD time out and let the ball drain.
- e) Player 1: select “Warp 4”. You have now a lit Right Lock but a raised drop target.

This is fixed in LX-8. The drop target is set correctly when Warp Factor 4 is chosen.

### **3.16 Drop Target Is Always Up After Final Frontier**

Final Frontier is raising the drop target at start and is keeping it up while it’s running. At the end it should lower it again if Right Lock and/or Shuttle Simulation are lit, but LX-7 doesn’t do that. This is fixed in LX-8.

#### **Steps to reproduce:**

- a) Start a game.
- b) Finish all regular missions.
- c) Before starting Final Frontier, make sure to light Right Lock or Shuttle Simulation.
- d) Start Final Frontier.
- e) Loose all balls but one.
- f) Drop target is up although Holodeck and/or Right Lock is lit.

### **3.17 Drop Target State After Cardassian and Ferengi Encounter**

Both Ferengi and Cardassian Encounter can cause problems with the state of the drop target if Holodeck and/or Shuttle Simulation is lit. The drop target will stay down at multiball start, but a ball going into the Top Hole will raise it, and it’s then staying up after the multiball has finished. This is fixed in LX-8. The drop target is always raised at the beginning of Ferengi and Cardassian Encounter and it is lowered again afterwards if needed.

#### **Steps to reproduce:**

- a) Start a game.
- b) Before starting Ferengi or Cardassian Encounter, make sure to light Right Lock or Shuttle Simulation so the drop target is down.
- c) Start Cardassian/Ferengi Encounter.

- d) Shoot the Right Loop to sink the ball in the Top-Hole.
- e) Lose all balls but one to end Cardassian/Ferengi Encounter.
- f) Drop target is up even though Holodeck and/or Right Lock is lit.

### **3.18 Drop Target State Can Be Wrong During Borg Multiball**

During Borg Multiball, the drop target is usually down, and it is only raised shortly when a new ball comes in from the shooter lane. However, if you start the Borg Multiball with a shot to the NZ and the Right Lock was not lit, the drop target will stay up throughout Borg Multiball. LX-8 removes this inconsistency.

### **3.19 Extra Ball Lit When Starting Final Frontier Can Cause Trouble**

If you start Final Frontier via Center Shot with a lit extra ball, the machine gets confused and releases a ball from the left VUK while the artifacts are still being counted. If that ball is lost before Final Frontier starts, the current ball ends directly. This is fixed in LX-8 by not showing the extra ball animation when Final Frontier starts.

#### **Steps to reproduce:**

- a) Light extra ball.
- b) Start Final Frontier.
- c) Let the ball that comes out of the left VUK while artefacts are being counted drain.

### **3.20 Battle Simulation Can Spill Over Into NZ Encounters**

Battle Simulation has a grace period of 0.5 seconds. If Battle Simulation has just timed out and you place a late shot into the subway, one more Battle Simulation shot is triggered. However, if NZ is lit and you shoot the ball into the NZ subway immediately after Battle Simulation ends, the NZ Encounter is started but you still get that one last Battle Simulation shot.

#### **Steps to reproduce:**

- a) Light the NZ.
- b) Start Battle Simulation.
- c) Wait until the Battle Simulation timer has counted down to 0 and the music has ended. Then - within 0.5s - shoot a ball into the NZ.

d) You get another cannon shot even though the NZ Encounter has started.

### **3.21 Launch-A-Probe Awards Light Lock With Lock Already Lit**

Launch-A-Probe assembles a list of valid awards (along with their probabilities) before randomly selecting one. The code that checks if the right lock is lit before making Light Lock available as a bonus had a problem, so that the Light Lock probability was never set to 0. This is fixed in LX-8.

### **3.22 Borg Init Keeps RTD Active but RTD Not Blinking Anymore**

There is a problem with Borg Multiball in LX-7: Not only Return-To-Duty is running at Borg Multiball start, but also a Borg Multiball Init Handler. This handler is running until 3 balls are on the playfield. If you manage to lose one ball and keep one or two constantly entering the subway, you can keep this handler running and thus have RTD like functionality although RTD might not be lit anymore!



## 4 Bugs Fixed In LX-9

### 4.1 Special At 250 Shuttles

When reaching a shuttle count of 250 the promised Special award is not given and the counter is wrong afterwards.

**Steps to reproduce:**

- a) Shoot the Beta ramp 250 times.
- b) You don't get an award and the counter isn't set correctly afterwards.

### 4.2 Warp 9 During Battle Simulation

If you start Warp 9 while Battle Simulation is running, a shot into the subway is going to be routed to one of the cannons but the shot isn't going to be counted for Battle Simulation. LX-9 disables the subway to cannon routing so balls get back onto the playfield via the left VUK.

**Steps to reproduce:**

- a) Reach Warp 8.
- b) Start Battle Simulation.
- c) Miss a target and increase Warp speed to 9 while Battle Simulation is running.
- d) Shoot the ball into the subway.
- e) The cannon gets loaded but the wrong animation is playing and if you hit the target, your shot doesn't count.

### 4.3 Search The Galaxy - Gamma Quadrant Bug #1

When hitting the Gamma Quadrant at the end of Search The Galaxy, two artifacts were awarded instead of one, although only one was indicated by the callout and animation.

**Steps to reproduce:**

- a) Check your artifact count via status report.
- b) Start Search-The-Galaxy.

- c) Hit all ramps in the correct order and you get the first artifact with callout and animation.
- d) Then hit the Neutral Zone and you get the second artifact with callout and animation.
- e) Check your artifact count via status report. You'll see that 3 artifacts have been collected.

#### **4.4 Search The Galaxy - Gamma Quadrant Bug #2**

If you have the Neutral Zone targets all lit before starting Search-The-Galaxy you can get the NZ artifact / Gamma Quadrant award without having to shoot any of the other quadrants by simply hitting the Neutral Zone in the right moment. LX-9 requires all ramps in the correct order and then a hit to the lit NZ for the NZ artifact to be given.

##### **Steps to reproduce:**

- a) Light all NZ targets and then start Search-The-Galaxy.
- b) Wait until the Search-The-Galaxy timer runs out.
- c) If you shoot the NZ within ~1 second, the mission's grace period is still active, and the NZ is already lit - allowing you to collect the Gamma Quadrant artifact.

#### **4.5 Lost Command Decision And Hurry-Up**

When a mission is active, Hurry-Up and Command Decision can't be initiated. They are usually re-lit once the mission or the multiball is over. However, if Borg multiball started while a mission is running, the previously lit Command Decision and Hurry-Up won't be lit anymore once both the Borg Multiball and mission have ended. This has been fixed in LX-9.

#### **4.6 Hurry-Up Active During Mission**

Even though Hurry-Up isn't supposed to be lit or active while a mission is running, reaching Warp 6 during Borg Multiball causes Hurry-Up to be 'lit in the background' and become active after Borg Multiball, even if there is also a mission that is being resumed. This issue has been fixed in LX-9.

#### **4.7 Infinite Tilt Loop During Borg Multiball Init**

Tilting during the Borg Multiball initialization right after the cannon shooting caused an infinite tilt loop, with the drained ball repeatedly returning to the playfield while the tilt animation continued. This has been fixed in LX-9, tilting now interrupts the Borg Multiball initialization process.

#### **4.8 Losing Last Ball While Final Frontier Is Starting**

Before LX-9, losing all balls in Final Frontier while Return-To-Duty was still flashing would end the current ball. With LX-9, even if you drain the last ball while Return-To-Duty is flashing, it won't end Final Frontier or the ball anymore.

#### **4.9 Launch-Probe And Skill-Shot Awards In Tournament Play**

In tournament mode the Launch-A-Probe and Skill-Shot reward was sometimes a lit Kickback, even if Kickback was already lit before. This is fixed in LX-9.

#### **4.10 Wrong Hole During Battle Simulation**

If you managed to get the ball into the wrong hole during Battle Simulation while the Cannon-Hit timer was still running, the next shot wasn't handled correctly - it didn't count. Additionally, it wasn't counted as a miss, and you could still reach level 6. Both of these issues have been fixed in LX-9.

#### **4.11 Return-To-Duty During Battle Simulation**

A lost ball during Battle Simulation while Return-To-Duty was still running used to travel from the catapult to the top-hole directly back into a cannon. Now the drop-target is raised shortly, so you can't just drain a ball to get it back into the cannons. This wasn't possible with LX-7's fixed Return-To-Duty time and was introduced with LX-8.

## 4.12 **Shoo..Player 2**

In a multiplayer game the “Shoot Again” callout was often interrupted by the callout announcing the current player. This callout is now disabled so the “Shoot Again” is played back without interruptions.

## 4.13 **Romulan Encounter During Borg Multiball - Once Again**

Surprisingly, despite various patches in LX-8, the resourceful Romulans managed to maintain their presence during Borg Multiball, with previously lit ramps remaining active in the background. LX-9 most likely marks the final resolution for Romulan Encounter during Borg Multiball.

## 4.14 **Buy-In Fixes**

### **Audio Interruption Removed**

Pressing the Buy-In button used to result in a somewhat unpleasant audio interruption that now has been resolved with LX-9.

### **Pulling The Trigger Before The Catapult Is Ready**

By pulling the trigger immediately after pressing the buy-in button, it was possible to start a mission without launching the ball. If the right lock was already lit, you could then - after a brief pause - lock that ball directly from the catapult, even though only the mission should have been started.

### **Holding Left Or Right Flipper Button While Pulling The Trigger**

The mission selection encountered a problem when a flipper button was held down while the trigger was pulled. The mission selection keeps running while the ball is already launched onto the playfield. This is fixed in LX-9.

## 4.15 **No Post-Game Show If Match Feature Is Disabled**

Previously, disabling 'A.1 18 Match Feature' (that's the last digits based free play lottery at the end) also turned off the post-game show. Thanks to LX-9, you can now enjoy the Captain's voice at the end of a great game without being interrupted by the plunger sound in the middle of the night.

## **4.16 Q Mission Started While RTD Is Running**

This issue was introduced with LX-8 and was triggered by a thread ID collision. When the Q mission was started while Return-To-Duty was still active the left orbit timer was flashing too fast and then was unlit early.

## **4.17 An Asteroid Close To The Enterprise**

An asteroid nearing the Enterprise while RTD was still active could trigger Return-To-Duty to constantly flash until the ball drained or another Return-To-Duty timer was started. This issue was introduced in LX-8, utilizing memory that appeared to be unused. However, it was discovered that this memory is used for asteroid animation calculations when the “countdown asteroid” approaches the Enterprise closely.

## **4.18 Warp 9 Fixes**

### **Only The left Orbit Was Lit**

Now both the left orbit and the left ramp are lit, because both shots increase the Warp factor.

### **Warp 9 Hides Mission Lights**

Mission lights were visible during Warp 9 and with a mission running in the background, that mission was then constantly lit and you could see already the next one blinking. Now all mission lights are disabled while Warp 9 is running.

### **Warp 9 Lights During Search-The-Galaxy and Asteroids-Main**

When starting Warp 9 during Search-The-Galaxy or the Asteroid Threat the mission’s target emblems were constantly lit and not flashing. Warp 9’s left orbit wasn’t blinking at all.

### **Warp 9 While Q Is Running**

LX-9 hides Q light effects and emblems - but the shots remain active and the timer is not running (like during Borg Multiball).

### **Warp 9 During The Romulan Encounter**

While Warp 9 is running the Romulan Encounter is paused - all counters and ramps are inactive until Warp 9 is over.

## **Warp 9 During The Ferengi Encounter**

Ferengi jackpot is disabled during Warp 9. The jackpot during the Cardassian multiball (the Neutral Zone) has always been disabled during Warp 9.

### **4.19 Extra Ball Animation In Battle Simulation**

At the end of Battle Simulation there was always an extra ball animation even if extra balls have been turned off or extra ball limits had already been reached. This has been changed in LX-9. There is now an explosion showing the points added by the 6<sup>th</sup> hit instead.

### **4.20 Extra Ball During Battle Simulation**

When the extra ball light show was triggered through a center shot during Battle Simulation the lighting for the next shot was not set correctly: instead of the next target light show it was still playing the effects for “ball on playfield during Battle Simulation”. This is fixed in LX-9.

### **4.21 Damaged Borg Ship In Lock Animation**

In a multiplayer game, if the first player made a 'late hit' to the Borg Ship right after the Borg multiball ended, it was possible for the next player to see a damaged Borg Ship during the Ball Lock animation. This issue has been fixed in LX-9.

### **4.22 Borg Multiball Drop Target Inconsistency**

If Borg multiball was started during Battle Simulation, balls coming from the catapult were routed into the subway. Now the drop target is always raised shortly when new balls are being launched, that's the normal Borg Multiball drop target behavior.

### **4.23 Missing Animation And Music At Mission Start**

There was a problem with animation priorities. In case the Launch-A-Probe bonus animation was still being played back when the center shot was hit, it was possible that the background music and the whole “Start Mission” animation playback was skipped. This has been fixed in LX-9.

#### **4.24 Ferengi Encounter Ball-Count Trouble**

Losing a ball right after hitting the Neutral Zone just before the Ferengi counter reaches zero could result in two balls on the playfield after the multiball was ended. This is fixed in LX-9. The ball count is updated more frequently.

#### **4.25 Ferengi Encounter RTD On Cannon Load Failure**

A rare failed right cannon load that sends the ball to the right outlane at the start of Ferengi Multiball no longer ends the ball or cancels the multiball. The ball is now returned to the playfield and the multiball continues.



## 5 Changes and Improvements in LX-9

### 5.1 Mission Lights During Borg Multiball

During the Ferengi, Romulan and Cardassian Encounters the mission inserts are disabled. During Borg Multiball they remained lit, and if a mission was running before Borg Multiball was started, even the next mission was already blinking. To avoid this problem and to make the lighting more consistent mission lights are hidden during Borg Multiball.

### 5.2 Mission Inserts When Starting a Mission

When starting a mission, you could sometimes see the next one already lighting up for a fraction of a second. This didn't look nice and therefore has been fixed.

### 5.3 Tournament Mode: NZ Encounters Equalized

The starting position inside the NZ encounter array was always assigned randomly for each player. This is now disabled if tournament mode is enabled. Then only the first player gets a random starting point that is then reused for all other players. See [8.1 The State of the Neutral Zone](#) for more details.

### 5.4 Shuttle Simulation Random Extra Ball in Tournament Mode

There is random extra ball hidden in a cave during Shuttle Simulation - even with Tournament Mode enabled. This does not happen anymore with LX-9.

### 5.5 Cannon Shot - Lag Removed

There was a random lag in the cannon operations code, causing the trigger detection to be delayed by up to 90ms. With LX-9, this lag has been reduced to less than 1ms by minimizing the sleep time within the loop that checks for trigger activation.

## 5.6 **Pause RTD While Launch-A-Probe Is Running**

Since you can now have two cannon turns for Launch-A-Probe, the Return-To-Duty countdown is paused while your aiming.

## 5.7 **Extra Ball Limits**

With LX-9, adjustment **A.2 1 EXTRA BALLS** now defines the maximum number of extra balls a player can earn per game. In earlier versions, it set the number of extra balls that could be held at once.

## 5.8 **Beta Ramp Shuttle Animation**

The Shuttle animation has been shortened by nearly 2 seconds. It now ends immediately when the shuttle disappears. The last image is shown only once before the animation finishes, rather than staying for an additional 2 seconds like before.

## 5.9 **Return-To-Duty Animation**

The delay after the Return-To-Duty animation now matches the time it takes for the ball to return to play. It has been shortened by more than a second.

## 5.10 **25 Million Anyone?**

When choosing 25 Million instead of Shuttle Simulation, the flippers were always enabled a little late - just before the ball reached the left flipper. In LX-9 they are now enabled as soon as the ball returns to the playfield.

## 5.11 **Poker Night Timing Refinement**

In previous versions, flippers were enabled as soon as the Poker Night results appeared on the DMD. LX-9 keeps them disabled until the ball has returned to the playfield. Additionally, the results on the DMD are shown for a shorter duration. Together with Adjustment **A.2 27 POKER NIGHT** set to 'Trigger Only' this makes Poker Night feel better integrated into gameplay.

## 5.12 Post Game Show

LX-9 improves normal and long post game show - whether or not Special Speech ROMs are installed:

The outcome of your game determines the “*Captain's Log, supplemental*” callout heard at the end. Without Special Speech ROMs, only one callout is available:

- “The crew performed admirably defending the Borg threat.”

If you have Special Speech ROMs installed and A.2 47 SPECIAL SPEECH POST GAME SHOW is enabled, there are three more callouts available:

- “Q's latest visit proved a true test to the crew's abilities.”
- “Our experience in the final frontier was most remarkable.”
- “While we have made significant discoveries, we must admit, this can only be the beginning.”

Each of these callouts uses the *Search-The-Galaxy* background music. If no *Captain's Log* callout is triggered and A.2 23 POST GAME SHOW is set to NORMAL, the game plays the “*Space, the Final Frontier...*” main theme instead. Previously, this setting also caused the background music for *Captain's Log* callouts to play longer. With LX-9, *Captain's Log* callouts now always come with the shortened background music, while the main theme triggers the long version.

If you're running the Special Speech version, the third of the three added *Captain's Log* callouts now has a 50% chance being replaced with the main theme audio.

Previously, the post-game show would only play if A.1 19 MATCH FEATURE was set to ON. Now, it starts independently.

## 5.13 Borg Cannon Shot Ball Saver

LX-9 adds a silent ball saver that stays active during the Borg Multiball cannon shots - just in case a ball unexpectedly ends up in the outlane. If that happens, at least your multiball is saved.

## 5.14 Extra-Ball Stays Lit During Hurry-Up

The lit extra ball insert isn't hidden anymore during Hurry-Up. In previous versions, it wasn't lit during Hurry-Up, making it a bit odd to hear Captain Picard's directive to collect the extra ball.

## 5.15 Rescue 5-Transported Animation

There was a sleep at the end of the animation which is actually already pretty long. So shooting the center shot hides the normal Rescue overview animation completely. Like for the Shuttle animation, the still image shown at the end is removed and the animation is about 2.5s shorter.

## 5.16 Tilt Warning Sound

The Tilt animation had no sound previously. So if you weren't following the animations on the display carefully, you might have probably missed tilt warnings from time to time. LX-9 uses the red alert sound along with the tilt warning animation.

## 5.17 High Scores

In the past, STTNG's high score system had its share of issues:

- The maximum allowed buy-in count for the Honor Roll was set to 1, meaning even with one buy-in, you'd still make it to the Honor Roll.
- Scores above 9,999,999,990 that didn't qualify for Q-Continuum were simply discarded.
- Scores pushed out of the Q-Continuum vanished into limbo.
- And the Grand Champion was always pushed down into the honor roll even when he was actually qualified for the Q-Continuum.

To fix these issues, large parts of the high score logic have been rewritten. Here's how it works now:

- Games with buy ins always go to the Officer's Club.
- Honor Roll is reserved for games without any buy-ins.
- Grand Champion is also reserved for games without any buy-ins.
- If you score above the 4<sup>th</sup> entry in Q-Continuum without any buy-ins, your score will end up in the Q-Continuum. No buy-ins allowed here either.
- A Score below the 4<sup>th</sup> Q-Continuum entry now goes to the Honor Roll. A score above pushes the 4<sup>th</sup> Q-Continuum entry down to Honor Roll.

- Non-default Q-Continuum scores can get pushed down to the Honor Roll. Default scores just disappear when being pushed out of Q-Continuum.



## 6 Troubleshooting

### **First game: trigger doesn't work, flipper buttons trigger catapult**

Don't worry. That's normal. The machine has never seen the trigger being pulled and thinks it might be broken. Once the trigger has been pulled the next ball-start is going to be ok.

### **Missing audio samples**

Maybe you have A.2 28 SPECIAL SPEECH and/or A.2 47 SPECIAL SPEECH POST GAME SHOW enabled but no Special Speech Audio ROMs installed.

### **Cannon fires too late to hit targets**

Set A.2 52 CANNON TURNS to "1" again or make sure your mark switches are properly adjusted (see 7.2 Cannon Turns And Mark Switches)

### **Checksum is correct but the machine won't boot**

Try with another EPROM.

### **Weird switch errors or strange behavior that won't go away after a factory reset:**

- Don't worry.
- Turn off the machine and remove the batteries for about 10s.
- Reinstall the batteries and power on again. Everything should be fine.
- **Note for NVRAM users:** A factory reset will not fully clear NVRAM. You'll need to erase it manually, or, if that's not possible, use a fresh empty module.

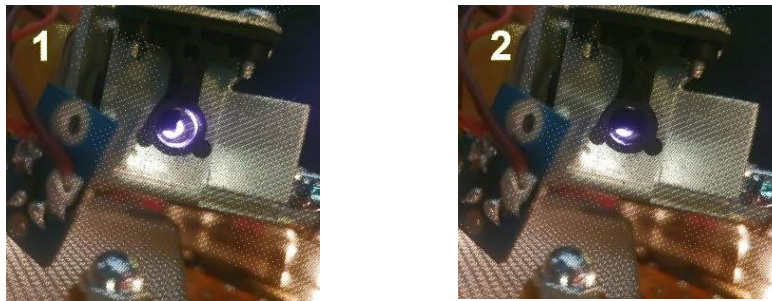


## 7 Cannon Operations

### 7.1 Cannon Turns At Boot

When the machine boots up, both cannon plungers fire. If enough light is then blocked by the plungers from arriving at the cannon opto receivers, the “ball inside cannon handler” is triggered and the cannons start turning.

Since the plungers aren’t thick enough to completely block the light, it really depends on the positions of the opto emitters and receivers and if they are new or old, freshly cleaned or dirty whether the cannon starts turning or not.



But why are the cannon plungers fired at all? The plunger activation is triggered by the Mark Switch Closed handlers, which are actually responsible for ejecting the ball from the cannons at the end of their rotation before they reach their home position again. At boot the handlers’ memory is cleared. The actual state of the switches is then read and written to memory. The already active switch handler interprets this as the Mark Switch going from open to closed, and it tries to eject the ball.

LX-9 disables the Mark-Switch-Closed handlers during boot by default, but they can be re-enabled via adjustment [A.2 51 CANNONS AT BOOT](#).

### 7.2 Cannon Turns And Mark Switches

The mark switch adjustment is crucial if [A.2 52 CANNON TURNS](#) is set to “2”. Typically, a “Mark Switch override” timer runs in the background, and once it times out, you can fire the cannon even if the Mark Switch hasn't registered as “open”. This means that even if your mark switches are slightly out of alignment, you likely won't notice any issues during gameplay.

However with [A.2 52 CANNON TURNS](#) set to “2” the cannons can return to their home positions with the ball still loaded. This makes proper mark switch

adjustment critical, as the timer is bypassed, and the game relies entirely on the state of the mark switches.

The most reliable way to determine where your mark switches engage is during gameplay. Simply don't fire the ball when it's loaded into the cannons. Once the ball is ejected and you see 'PULL TRIGGER TO SHOOT BALL' on the DMD, that's the point where your mark switch activates. Ideally, this should occur close to the home position, just before the wireform begins. This ensures that all possible targets could have been hit while the mark switch remains open. If your mark switches have been replaced with roller switches, you might need to mount them with only one screw and offset them to the left or right to find the optimal position.

## 8 The Neutral Zone

### 8.1 The State of the Neutral Zone

Although with LX-7 the behavior of the Neutral Zone seems to be random - there is no random generator in the Neutral Zone. The Neutral Zone has a state and it is always clearly defined what will happen there if you light all targets.

Inside the firmware is a list with 24 entries. The list reads “F,C,R,L, C,R,F,L, R,F,C,L, .....” (F = Ferengi, C = Cardassian, R = Romulan, and L = Lock)<sup>1</sup>. So every 4<sup>th</sup> entry in the list is a lock. The encounters are thrown in between the locks.

At the beginning of a game an index pointing into this list is calculated. This index is the “State of the NZ” and determines which encounter is waiting there for you. If you finish an NZ Encounter, the index is increased by 1 and the next entry in the list is the new state of the NZ. However: If Borg Multiball was already played in the current game, an “L” (like “Lock”) is skipped - you can only lock balls in the NZ as long as you have not finished a Borg Multiball.

To initialize the state of the NZ at game start, a random “Lock” entry is selected in the list. Then there is an offset which is subtracted from its index. This offset is the number of NZ Encounters you have to play before the NZ enters the “Lock” state. After a factory reset this offset is 1 and it is adjusted every 240 games by comparing game statistics with the chosen “Multiball Percent” value. But for the first 240 games the offset is “1”, which means the state of the NZ is at the start of a game always exactly one step before a “Lock”. In other words, there is only one NZ Encounter to complete before the NZ Lock becomes active. If the offset is then increased to 2 (after 240 good games), the “Lock State” always comes after 2 or later after 3 NZ Encounters. As stated above there’s one exception: if Borg Multiball has been played, then the “Lock” state is skipped.

And this is how the “State of the NZ” works. The Encounters are more or less random, but always after 1+offset Encounters there’s a lock. The offset is adjusted only very sporadically. If you have understood this behavior and count your NZ Encounters, the lock in the NZ will not surprise you anymore, even with LX-7.

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<sup>1</sup> Actually it’s not F,C,R,L but 0,1,2,3. This here in green is the list from LX-7:

Hex
1c fe 35 b6 1a 01 35 b6 03 02 01 00 03 01 02 00
03 01 00 02 03 00 01 02 03 00 02 01 03 02 00 01

## 8.2 Neutral Zone Target- and Lock-Lighting Behavior

### And why there is Adjustment `A.2 30 SHOW NZ LOCK`

In LX-7 NZ targets can always be “activated”, unless there is a NZ Encounter already running. If a regular mission is running (Time Rift/Rescue, etc), although you can “activate” the targets, the according inserts won’t light up directly. But after the mission has been finished, you may simply have a completely lit NZ.

Since you can only start NZ Encounters after the regular mission has been completed, the “NZ target lighting behavior” is totally okay for NZ Encounters.

But you can lock a ball in the NZ *while* a regular mission is running - without being able to see the state of the NZ targets. In addition, the lock-is-lit only comes when you light up the 3<sup>rd</sup> target. If the ball then goes directly into the subway, it’s immediately locked. And the NZ Lock Insert was never lit... And that’s what you have in LX-7: a lock insert for the NZ that’s almost never lit.

With adjustment `A.2 30 SHOW NZ LOCK` you can now make better use of the NZ Lock Insert - without changes to LX-7 game logic:

If the NZ is in lock-state, then the NZ Lock Insert will now be lit by the 1<sup>st</sup> hit to the NZ. This ensures that you can now see before the “decisive” 2<sup>nd</sup> or 3<sup>rd</sup> hit - that might go directly into the subway - that there will be a ball locked once all NZ targets have been lit. If you hit the NZ good two targets might get lit at the same time, so the Lock Insert definitely has to be lit after the 1<sup>st</sup> hit.

But only the insert will be lit earlier than in LX-7, the game logic is not changed. And “Lock is lit, Sir” is played as usual only at the 3<sup>rd</sup> NZ target hit. Although the NZ target states are not visible during regular missions at least the NZ Lock Insert will light or stay on during regular missions. So you can always - even if you are playing a regular mission - see that there is a lock waiting for you and it might be worth to shoot a ball into the NZ.

## 9 Additional Hacks

### 9.1 Country Settings

Some STTNG machines have DIP switches on the MPU where language settings can be configured. To reduce complexity, **LX-9 ignores these hardware-coded country settings on the MPU**. Instead, “USA1” was chosen as default. This way, even if you have no DIP switches on your MPU, you can profit from LX-9 default settings optimized for home use - without soldering or cutting jumpers. If you still want to change the language, use adjustment `A.1 21 LANGUAGE`.

### 9.2 Volume Buttons

In LX-9, the VOL+/- service buttons can be used while the coin door is closed. For instance, if you add switches to the coin-reject buttons and connect them to the control panel, the machine’s volume can be controlled without having to open the coin door.

**Remark:**

When a game is running and the coin door is closed, no animation will be shown when you change the volume, it might otherwise abort running animations and thus interfere with game logic.

## 10 Recommended VPin Settings

Virtual pinball STTNG tables usually have a scripted subway and adjustment `A.2 44 NZ SUBWAY HANDLING` should be set to “SHORT + RBP” or “LX-7”.



# 11 Recommended Tournament Settings

## **A.1 26 TOURNAMENT MODE: ON**

Tournament mode equalizes Launch-A-Probe and Skill-Shot awards: Extra ball and multiball percentages are ignored and replaced by a static list of awards without extra balls.

With LX-9 tournament mode also equalizes the encounters in the Neutral Zone by giving each player the same entry point into NZ's random list. (For details please read: 8.1 [The State of the Neutral Zone](#)). It also disables extra balls in Shuttle Simulation.

## **A.1 03 MAX EB. COUNT: NO EX.BALL**

In case games are already taking too long. Just disable all Extra-Balls.

## **A.2 02 EB PERCENTAGE: OFF**

Only random extra balls during Launch-A-Probe and Skill-Shot are disabled. If [A.1 26 TOURNAMENT MODE](#) is enabled, this is not needed.

## **A.2 50 ALTERNATING MILLIONS: ON (default)**

This prevents spamming the Alpha- or Beta-ramp for Millions award.

## **A.2 54 KICKBACK.FAIL RTD: ON (default)**

Enabling this adjustment ensures that Kickback is no longer a gamble.

## **A.2 58 MISSION ARTIFACT: REQUIRED**

Missions can't be timed out to reach the Final Frontier.

## **A.2 59 LOCK IN SHIP: OFF**

If a ball is already locked inside the Borg ship by another player, the next Delta-Quadrant lock requires now only a shot up the ramp to the wire frame. To avoid this, the physical ball lock inside the Borg ship is disabled for all players. All the time.



## 12 Compatibility

LX-9 was successfully tested with:

- ColorDMD
- Pin2DMD
- TiltAudio
- PinSound
- LEDOCD / GIOCD
- AfterGlow and AfterGlow GI

## 13 Checksums

**LX-7 Special Speech:**

md5: 9d9cee575ace3f89e05f2631b3e300a1

**LX-8:**

Service Menu: AD41.BE08

md5: 24b52ce325bc4f2706a95d5e241d3b15

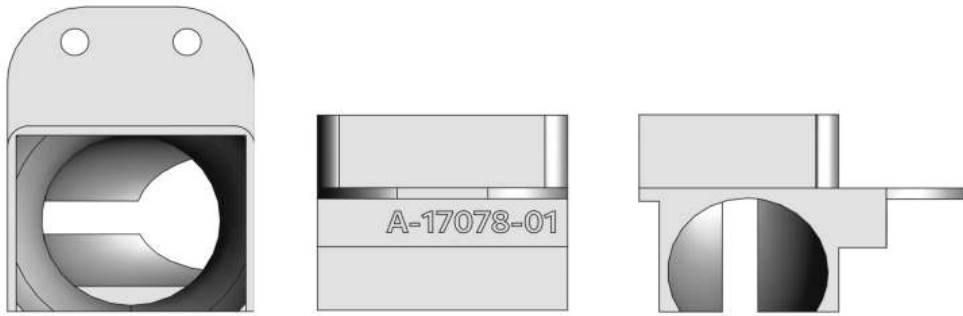
**LX-9:**

Service Menu: A6B1.4E09

md5: 17e68ec682f94f5e243ff471596004aa



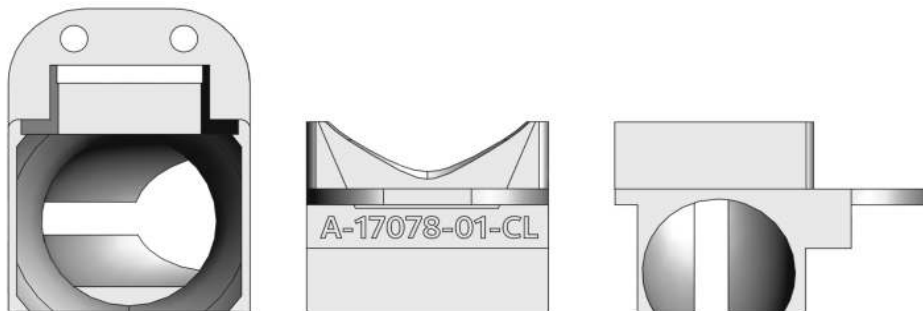
**14 STTNG Subway Mod**



**Part Number: A-17078-01**



**Part Number: A-17078-02**



**Part Number: A-17078-01-CL**



## 14.1 Overview

The **Subway Mod** consist of two parts, one for the Neutral Zone subway entry and one for the Left Hole / Command Decision subway entry. They improve ball detection reliability, speed up subway operation and thus gameplay by accelerating the balls into the right direction, and also register slow balls that simply roll into the Neutral Zone without triggering a NZ target first.

The modification for the NZ is available as standard version **A-17078-01** and as Cliffy version **A-17078-01-CL**. The standard version protects your playfield around the Neutral Zone and the Cliffy version is slightly smaller and has a cut out at the front, leaving just enough room for the Cliffy protector. Both versions feature a switch that must be connected to the middle NZ target. That way, LX-9 can register slow balls rolling into the Neutral Zone so they aren't misinterpreted as Left Hole hits triggering Command Decisions, Advance In Rank or shuttle animations anymore.

To avoid "double detections" when a ball triggers the middle target and then goes from there into the subway, **A.2 44 NZ SUBWAY HANDLING** must be set to "MOD INST."

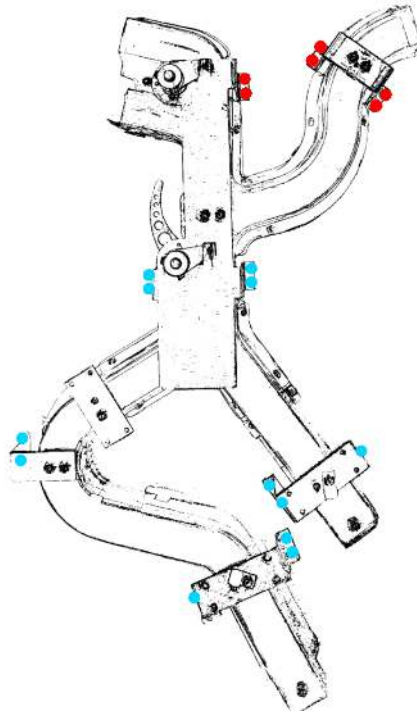
The Left-Hole Mod **A-17078-02** has no switch and simply makes sure balls arrive at the Left Hole opto as fast as possible.

They all can be installed without any screws just by clamping with the existing hardware – so they can easily be removed again.

## 14.2 Installation Instructions

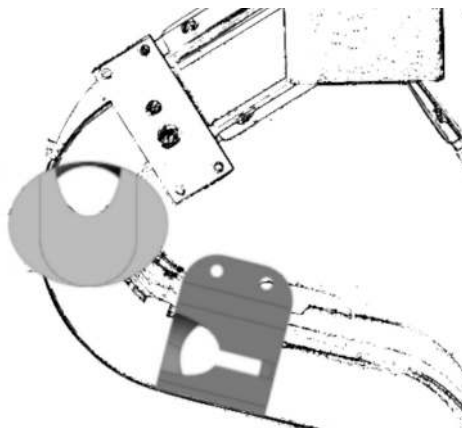
1. Remove all balls: first remove the glass, power on the machine, go to the service menu and choose **T. TESTS** → **T.18 CLEAR OUT BALLS** and take all balls out.
2. Power off and raise the playfield.
3. Both mods can be installed without removing the subway, it can be a bit tricky and you might need some time to get the mods into position but it generally works. In case your subway hasn't been cleaned for a while, you might want to remove the subway anyway what then makes the mod installation easier. If not just skip to step 4.
  - a) First unplug the molex connector for the right cannon, the connector for the subway coils and the connector for the subway optos.
  - b) Remove the right cannon, the subway can't be removed otherwise.

4. Now remove all screws marked blue in the picture below:



5. The lower part of the subway should now be loose. Make sure to move the cables on the left most bracket out of the way and try to get the lower part of the subway one or two inches away from the playfield.
6. Start with the Left Hole Mod (A-17078-02):

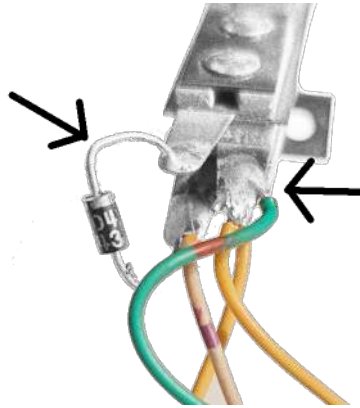
Make sure it's oriented correctly, move it directly under the Left Hole and gently press it in. It's a pretty tight fit and you might need to give it a few tries but it will finally slide in.



7. Now the Neutral Zone Mod (A-17078-01/-CL):
  - a) If you have a Mantis protector in the Neutral Zone, it must be removed. With A-17078-01 your NZ is protected from being damaged. The screw holes for the Mantis protector can be used to secure the the new NZ mod.
  - b) The NZ Mod is going to be clamped by the metal plate that protects the subway and the NZ switches behind the NZ hole. Remove the screw that holds this plate on the left side and loosen the one on the right side.
  - c) If your subway is still installed make sure you route the cables connected to the NZ Mod switch downwards - between the subway and the playfield.
  - d) Make sure the NZ Mod is oriented correctly. Place it exactly below the NZ hole and push it in gently. Again, the fit is tight, take your time. You might need one hand to keep the NZ metal plate away or unscrew the remaining screw a bit more. If you have a Cliffy protector installed, use the fingers of your left hand to press the sides of the Cliffy against the playfield from the upper side of the playfield while pushing the mod into the NZ hole with your right hand. Make sure to leave some room for the front of the Cliffy while pushing the NZ Mod in. You might need to adjust the Cliffy and the mod's position from the upper side of the playfield once you have it in place.
  - e) Clamp the NZ Mod with the NZ metal plate from the back and reinstall its two screws again.<sup>1</sup>
8. Now it's time to put the subway back into position:
  - a) If you have removed the subway completely start with the screws marked in red in picture (4).
  - b) Get the left most subway bracket below the wires again and move the subway into position.
  - c) Start with a screw somewhere at the bottom and make sure all brackets are aligned with the screw holes at their old position and re-install all screws.<sup>1</sup>
  - d) If the subway was removed:
    - Install the cannon assembly again and make sure to connect all molex connectors (cannon, optos, diverters).
9. Finally connect the NZ mod's cables to the NZ's middle target like pictured below: one just behind the diode, the other on the right side where the two yellow and the green wire are soldered. Connection order is irrelevant.

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<sup>1</sup> When putting the screws back in, make sure to turn the screws counterclockwise until you hear a "tok". That's when you should start turning clockwise to tighten them.



10. Make sure you have no screws left and lower the playfield again. Power up and please go to **T. TESTS** → **T.1 SWITCH EDGES**. Check that the switch inside the NZ-Mod registers as NZ middle target and all 3 NZ targets are still working. Finally roll a few balls into the NZ to verify that the switch is adjusted correctly.
11. Go to **A.2 44 NZ SUBWAY HANDLING** and set it to “**MOD INST**”.
12. Install all 6 balls and put the glass back in again.
13. You’re now ready to enjoy fast subway handling and improved gameplay on one of the greatest pinball machines of all time. Engage!



