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1978 Yamaha XS650 Buyer's Guide

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The 1978 Yamaha XS650E / XS650SE

Factory-Correct Restoration Guide — IronHead

KEY FACTS AT A GLANCE

- **Model year covered:** 1978 only — both US variants: XS650E Standard (model code 2F0) and XS650SE Special (model code 2M0, first year of the Special line). This guide does not cover other years except where differences are explicitly noted.
- **Engine (both):** 654 cc air-cooled SOHC 360° parallel twin; 75.0 mm × 74.0 mm bore × stroke; 8.4:1 compression; 53 bhp @ 7,000 rpm; 39.78 ft-lbs @ 6,000 rpm.
- **Fuel system (both):** Two Mikuni BS38 constant-velocity carburetors.
- **Ignition (both):** Battery-and-coil breaker-point ignition with mechanical advance — the last points-ignition year before 1980's TCI.
- **Starting (both):** Electric starter + kick starter.
- **Transmission (both):** 5-speed constant-mesh manual, chain final drive, wet multi-plate clutch.
- **1978 chassis change (both):** 35 mm fork stanchions (up from 34 mm) and floating single-piston front calipers replace the opposed-piston units.
- **XS650E Standard:** dual 267 mm front discs; 180 mm rear drum; 15.0 L tank; Star Black or Spruce Metallic Green; serials from 2F0-000101. The LAST year of the Standard in the US.
- **XS650SE Special:** teardrop fuel tank (11.5 L / 3.0 gal); pullback handlebar; stepped seat; cruiser trim; Vintage Burgundy or New Midnight Black; serials from 2F0-100101; 210 kg.
- **Key 1978-only features:** new 2F0/2M0 serial series; 35 mm forks; floating calipers; the Special's debut year.

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The Yamaha story

Yamaha's history is summarized in full in the IronHead Yamaha manufacturer guide; the key points relevant to this restoration:

- Yamaha Motor Co., Ltd. was founded in 1955, spinning out of Nippon Gakki (the musical-instrument maker) under president Genichi Kawakami.
- Yamaha's first motorcycle was the 1955 YA-1 "Red Dragonfly," a 125 cc two-stroke whose success established the tuning-fork brand in motorcycling.
- Through the 1960s Yamaha built its reputation on two-strokes — the YDS series twins and the TD/TR production racers that dominated small-displacement road racing.
- The XS-1 of 1970 was Yamaha's deliberate four-stroke answer to the Triumph Bonneville and Harley-Davidson Sportster: a 654 cc overhead-cam parallel twin aimed squarely at the American big-bike market.
- By the mid-1970s the XS650 was established as the Japanese alternative to the British twin — and it outlasted them all, running in production from 1970 through 1983.

The XS650 story

The model-line history is summarized here; the sections below cover what makes the 1978 XS650E / XS650SE specifically correct.

- The XS-1 (1970) launched the line: 654 cc SOHC twin, kick-start only, drum brakes front and rear, built to take on Triumph and Harley-Davidson on their home ground.
- The XS-1B (1971) refined the formula in Candy Orange, retaining the front drum brake.
- The XS-2 (1972) added the electric starter and a 298 mm front disc — the first major mechanical revision.
- The TX650 (1973) brought the larger 14 L tank and a front end provisioned for a second disc.
- The TX650A (1974) was the Percy Tait chassis revolution: longer swingarm, repositioned engine, dual 267 mm front discs, and a stronger starter with the compression release deleted.
- The XS650B (1975) restored the XS name; the XS650C (1976) moved the front calipers behind the fork legs.
- The XS650D (1977) is the best-documented Standard — Yamaha's supplementary service manual was written for it.
- 1978 split the line: the XS650E Standard (the last roadster) and the XS650SE Special (the first factory custom), both on 35 mm forks with floating calipers.
- 1979 ran three variants — F Standard, SF Special (with rear disc), and the 2F Special II — the last year of points ignition and BS38 carburetors.
- 1980 brought transistorized TCI electronic ignition and Mikuni BS34 carburetors; the lineup became Specials only.
- 1981 (H/SH) carried the formula with new colors; 1982–83 closed the line as the Heritage Special (SJ/SK).
- Total XS650 production exceeded 500,000 units across the fourteen model years.

What makes the 1978 unique

1978 is a two-motorcycle year: the last of the Standards and the first of the Specials. The XS650E Standard closes out the roadster line that began with the XS-1 — after 1978, the US market got Specials only. The XS650SE opens the factory-custom line that would carry the model to 1983. Both share the 1978 chassis updates, and both are the last XS650s with breaker-point ignition.

1978 chassis updates (both variants):

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- **35 mm fork stanchions.** Up from the 34 mm tubes used since 1974 — the

"beefier forks" of the marque timelines. Fork seals, sliders, and triple trees are 1978-on items.

- **Floating single-piston calipers.** The opposed-piston calipers are gone,

replaced by floating single-piston units. Some period opinion called this a backward step; in practice the new brakes are just as powerful with less initial bite. Either way, 1978 calipers, discs (different offset from pre-1977), and master cylinders are a matched set — pre-1977 discs do not interchange with 1978-on wheels.

- **New 2F0/2M0 serial series.** The 447- prefix era ends; 1978 numbers start

at 2F0-000101 (E) and 2F0-100101 (SE).

XS650E Standard — the last roadster:

- Star Black or Spruce Metallic Green; 15.0 L tank; dual 267 mm front discs;

180 mm rear drum. Trim and riding position are the familiar Standard formula. Because 1978 was the Standard's final US year, the E is the last chance for the original roadster silhouette — originality here means resisting every urge to "Special-ize" it.

XS650SE Special — the factory custom debuts:

- **Teardrop fuel tank, 11.5 L (3.0 gal)** — smaller and shaped, the defining

Special silhouette. The tank, seat, and side covers are Special-only parts.

- **Pullback handlebar and stepped seat** — the cruiser riding position.
- **Vintage Burgundy or New Midnight Black**; 210 kg.
- BS38 carburetors carry over; trim is cruiser-style from the start.

1978 buyer cautions:

- **Standard vs. Special parts do not mix.** Tanks, seats, bars, side covers,

and rear fenders differ between the E and SE. Verify the model code (2F0 vs 2M0) and serial block before buying any bodywork.

- **Disc offset.** Pre-1977 and 1978-on front discs have different offsets —

the wheels interchange but the discs do not. A 1978 with earlier discs will not align its calipers; check disc part numbers, not just diameter.

- **Last-points-year electrics.** 1978 is the final year of the points ignition

and mechanical advance. The advance-unit weights and springs are wear items; a sticky advance shows up as a hanging idle and flat midrange.

Serial numbers and model codes

Model year: 1978 · Designation: XS650E / XS650SE · Model code: 2F0 / 2M0. Frame and engine serials: E: 2F0-000101 onward; SE Special: 2F0-100101 onward. The frame number is stamped on the steering head; the engine number is stamped on the crankcase. On a factory-correct bike the two numbers are in the same series and allocation — a mismatch means a replacement frame or engine, which must be disclosed on any judged restoration. Decode carefully: the serial prefix (e.g. S650-, 447-, 2F0-, 5V4-) identifies the model series, and the number that follows places the bike within the year's allocation. The XS650E / XS650SE's prefix is 2F0 / 2M0-series as listed above; any other prefix on the frame or engine means the component is not original to this model year.

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Engine and internals

654 cc (1982–83 Specials: 653 cc) air-cooled SOHC 360° parallel twin. Bore × stroke 75.0 mm × 74.0 mm; compression ratio 8.4:1 (per the factory figures for this year); output ~53 bhp. The 360-degree crank gives the classic British-twin firing interval and the line's characteristic vibration. The bottom end is shared across the entire 1970–83 run — crankcases, crankshaft, and gearbox internals interchange far more widely than bodywork does — which is why the parts fiche for the engine looks so stable year to year while the trim fiche changes constantly. Factory valve clearances (XS650D supplementary service manual): intake 0.10 mm (0.004 in), exhaust 0.15 mm (0.006 in), checked cold. Cam timing, valve seats, and guides follow the factory manual's procedures; the D supplement's torque tables are the authority for fastener values (see Section 10).

Fuel system

Carburetors: 2 × Mikuni BS38 constant-velocity. Points-era bikes (1970–79) run Mikuni BS38s; TCI-era bikes (1980–83) run BS34s. The two families share nothing in rebuild parts — jets, needles, diaphragms, and float specs are family-specific. Identify the carbs by the body stamping before ordering anything. Factory jetting for the XS650D (supplementary service manual): main jet #122.5, with market variants #117.5 and #112.5 — the manual explicitly documents all three. Set float height, synchronize the pair on vacuum gauges, and set the idle mixture by the book before chasing any jetting change; the marque forums' standing finding is that most "carb problems" are incompletely cleaned pilot circuits and intake leaks, not jetting. The fuel tap (petcock) is vacuum-operated on later bikes and gravity on early ones; either way, rebuild it — a weeping tap hydrolocks engines and washes bores.

Electrical system

Ignition: Breaker points with mechanical (centrifugal) advance (last points year). Starting: Electric starter + kick starter. Breaker-point maintenance is the standing task: set the points gap, verify the mechanical advance moves freely and springs back (weak springs retard the curve and flatten the midrange), replace condensers on any unknown-history bike, and static-time then strobe-time the ignition. The charging system is the known weak point of the early bikes — the marque community's standing advice is to load-test the rotor and stator, replace the rectifier/regulator with a modern combined unit, and clean every bullet connector. Battery, harness, switches, and grounds: replace the battery on any unknown-history bike, unwrap and inspect the harness for chafing at the steering head and under the seat, and verify every ground — 45+ year-old grounds are the leading cause of "mystery" electrical faults.

Transmission and driveline

5-speed constant-mesh manual gearbox. Primary reduction 72/27 (2.667). Factory gear ratios (D supplement): 1st 2.462, 2nd 1.588, 3rd 1.300, 4th and 5th per the manual's table; final drive by roller chain. Clutch: wet multi-plate. Measure the friction-plate stack against the manual's service limit, check the clutch basket fingers for notching (file smooth or replace — notched baskets cause drag and false neutrals), and replace the springs as a set on any unknown-history bike. Chain and sprockets: replace as a set. Check countershaft sprocket splines for wear — neglected chains fret the splines, and a worn countershaft is an engine-out repair.

Brakes

Dual 267 mm front discs (floating single-piston calipers, 1978-on); rear drum (both variants). Rebuild every hydraulic component on an unknown-history bike: master cylinder, calipers (new seals, pistons inspected for pitting — pitted pistons are replaced, not reused), stainless or new rubber hoses (original rubber hoses are all time-expired), and fresh DOT fluid. 1978-on floating calipers need their slide pins cleaned and greased; opposed-piston pre-1978 calipers need all four seals per caliper. Discs: measure thickness and runout against the manual's limits. Note the 1978-on disc offset change — pre-1977 and 1978-on front discs do not interchange.

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Wheels, forks, and suspension

Wheels: Wire-spoked alloy rims; 3.50 × 19 front, 4.00 × 18 rear (E); Special trim (SE). Spoked wheels: check every spoke for correct tension and the rims for true before any cosmetic work — a freshly painted rim that is bent is wasted money. Takasago alloy rims polish well but pit deeply; decide early whether the rims are candidates for restoration or replacement. Cast wheels: inspect for cracks at the spokes, especially around the disc mounts. Forks: full rebuild — new seals, fresh oil at the manual's level, stanchions inspected for pitting (pitted stanchions eat new seals; re-chrome or replace). Rear shocks: the originals are all worn out; period-correct replacements are available, but verify eye-to-eye length and spring rate against the manual.

Paint, trim, and finishes

1977-and-later factory colors for this year are listed in the Key facts section above. Paint codes and stripe layouts are year-specific — verify against the parts fiche for the XS650E / XS650SE, not against a generic XS650 reference. Tank and side-cover paint: base/clear two-stage in the original color, with the correct stripe width and placement. Badges are year-specific — the 1978 badges differ from neighboring years in script, color, or mounting. Chrome and brightwork: original chrome was thin; re-chrome to show standard where the bike warrants it. Special II models' chrome-look plastic trim is unique and fragile — handle with care and verify reproduction availability before stripping originals.

Torque specifications

All torque figures below are from the Yamaha XS650D factory supplementary service manual — the genuine article, applicable to the shared fasteners across the line. Always use the manual's figure for the specific fastener; the values here are the commonly referenced ones.

Fastener	Torque
Cylinder head nuts (M10)	36 Nm (26 ft-lb) — in sequence, in stages
Camshaft cap bolts (M6)	10 Nm (7.2 ft-lb)
Cam sprocket bolt	40 Nm (29 ft-lb)
Crankcase bolts (M6)	10 Nm (7.2 ft-lb)
Crankcase bolts (M8)	20 Nm (14.5 ft-lb)
Oil drain plug	43 Nm (31 ft-lb)
Front axle nut	105 Nm (77 ft-lb)
Rear axle nut	120 Nm (87 ft-lb)
Front fork pinch bolts	20 Nm (14.5 ft-lb)
Handlebar clamp bolts	23 Nm (17 ft-lb)
Brake caliper mounting bolts	40 Nm (29 ft-lb)
Rear brake torque arm nut	25 Nm (18 ft-lb)
Sprocket nuts	60 Nm (43 ft-lb)
Spark plugs	20 Nm (14.5 ft-lb)

Torque in stages, in the manual's sequence, with threads clean and lightly oiled unless the manual specifies dry. Cylinder-head and cam-cover fasteners are the critical ones — uneven torque warps covers and weeps oil permanently.

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Service schedule and wear items

Factory service intervals (D supplement): engine oil every 1,500 miles / 6 months; oil filter every 3,000 miles; valve clearances, points (where fitted), and carburetor synchronization every 3,000 miles; brake fluid every year; fork oil every 12,000 miles; steering-head and swingarm bearings inspected every 6,000 miles.

Item	Spec / interval
Engine oil (with filter change)	2.5 L — SAE 20W-40/20W-50, every 1,500 miles
Final drive chain	Clean, lube, and adjust every 300 miles
Valve clearances	IN 0.10 mm / EX 0.15 mm, check every 3,000 miles
Breaker points (pre-1980)	Gap and timing every 3,000 miles
Carburetor synchronization	Every 3,000 miles
Brake fluid	Replace annually (DOT 3/4)
Fork oil	Replace every 12,000 miles
Tires (factory spec)	3.50H-19 front, 4.00H-18 rear (D supplement)

Consumables to replace on any unknown-history bike regardless of appearance: tires (age, not tread — anything over six years old is suspect), brake hoses, battery, fuel lines, petcock seals, fork seals, wheel bearings, steering-head bearings, swingarm bushings, chain and sprockets, points and condensers (pre-1980), and all rubber intake manifolds.

Rust-prone areas and inspection points

Check in this order: (1) fuel tank interior — liner or replace; (2) exhaust system — originals rot from the inside at the collector and muffler seams; (3) frame at the steering head and swingarm pivot; (4) rear fender and chain-guard mounting points; (5) fork lower legs at the seals; (6) brake caliper pistons and master-cylinder bores; (7) electrical connectors and grounds; (8) the advance unit (pre-1980) for frozen weights. Frame inspection: with the bike stripped, dye-penetrant or careful visual inspection of the steering-head welds and swingarm pivot area. Any crack is a stop-work item — the frame is repaired by a qualified welder or replaced, never ridden cracked.

Restoration sequence

Step 1: Document and photograph everything before disassembly — cable routing, fastener positions, wiring runs. Bag and tag every fastener by assembly. **Step 2:** Assess the frame and running gear first: check the frame for cracks and straightness, then rebuild the rolling chassis (bearings, brakes, forks, wheels) before the cosmetics. **Step 3:** Engine: full strip, measure everything against the factory manual's service limits. The bottom end is robust; budget for valve seats, guides, and a rebore only if measurements demand it. **Step 4:** Carburetors: ultrasonic clean, all new soft parts, set to factory jetting and float height before any tuning. Do not re-jet to fix what is actually an intake leak or weak spark. **Step 5:** Electrical: rebuild the harness or replace it — 45+ year-old wiring is not trustworthy. Points-era bikes get new points, condensers, and advance-unit service; TCI-era bikes get connector hygiene and igniter/pickup testing. **Step 6:** Paint and plating: bodywork painted in the correct year color with correct stripes and badges; chrome re-plated to show standard; fasteners correctly finished (zinc, black, or plain as original). **Step 7:** Reassembly in the factory sequence, torqued to the manual's figures, with all fluids fresh and every adjustment set to spec. **Step 8:** Shakedown: 500 careful miles with frequent checks, then re-torque the head, re-check valve clearances, re-synchronize the carbs, and change the oil. The bike is finished when it starts, idles, and stops like Yamaha intended.

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