

# Pilot Flight Check: HARLOW PJC-2



From basket case to show-winning 'classic,' Max Harlow's 35-year-old design refined by airline pilot owner. Of panel layout, for example, evaluator says, 'Why don't they design 'em like this today?'

by DON DOWNIE/AOPA 188441

EDITOR'S NOTE: Had it not been for World War II, as well as finances and other breaks of the game, the name Max B. Harlow (1902-1967) might be as well known in aviation today as are the names Beech, Cessna, Piper, and Taylor. Early in 1935, Harlow joined the faculty of Pasadena (Calif.) Junior College (PJC) as assistant professor of aeronautics. Among PJC students at the time were Mel Heflinger, now a DC-10 captain for United Air Lines, and PILOT Western Editor Don Downie. The two recently held a mini class reunion and, to no one's surprise, aviation was the main conversational fare. Their getting together also, however, presented a unique opportunity to provide readers with a change-of-pace PILOT Flight Check on the plane Max Harlow developed.

Did you ever go to a class reunion and actually recognize your classmates? This was a reunion of the class of 1937-1938, Pasadena (Calif.) Junior College, and there were just "three" of us at this meeting. Back in school days, Mel Heflinger was a student in the then recently formed aeronautics department and I was studying journalism. The third "member" of our reunion was the No. 1 prototype Harlow PJC-2. Heflinger and his flying friends had restored this rare bird from almost a "basket case" to a mint-condition 35-year-old airplane.

Eight years of "TLC" (tender, lovin' care) went into the restoration and updating of N18978. Today she's winning first-place ribbons in the "classic age" (1935-1941) competition at almost every air show she visits. The Harlow PJC-2, shown on The PILOT cover this month, is a surprisingly modern airplane when you consider the project began in 1935 and the first airplane flew in late 1937. She's modern all the way through: all-metal, strutless, retractable gear, retrofitted with a controllable prop, flaps and a cruise speed in excess of 150 mph.

The one-and-only PJC-1, rolled out of the junior college shop just 10 months after start of initial construction, with a Department of Commerce test pilot at the controls. On its first flight, there was 400 pounds of lead ballast lashed to the rear-seat frame, for an extreme aft CG (center of gravity) condition and the ship entered an uncontrollable flat spin. The pilot bailed out safely. The ship landed almost flat near the site of Mines Field (now LAX) and some parts from the wreck were incorporated on the No. 1 PJC-2, which was equipped with a larger vertical tail.

Just three months after its first flight, the new Harlow, with its designation changed to PJC-2, received Approved Type Certificate (ATC) No. 659. That particular airplane was, and is, N18978. During his rebuilding of the

"Classic" PJC-2, one of less than a handful still around out of the original nine or 10 built. The 35-year-old modified aircraft has many features PILOT evaluator says would be welcomed by pilots on today's production aircraft. Tailwheel, incidentally, does not retract. A starlet named Jean Harlow once flew in the PJC-2 to promote a movie produced by a pilot by the name of Howard Hughes.

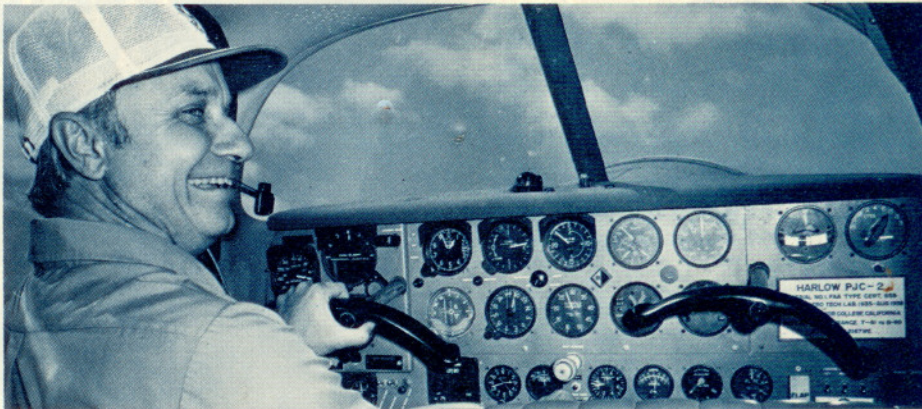
All photos by Dana and Don Downie

airplane, Heflinger made a number of modifications. He installed a 185 hp Warner engine (200 hp on takeoff) and a Hartzell Selectomatic prop, used on the original Beech Bonanza and early model Navions. They replaced the 145 hp Warner "Super Scarab" that had been hooked to a Curtiss-Reed cruise pitch prop which "probably produced about 100 hp on takeoff," according to Heflinger. New wheel fairings and strut covers, designed to clean up the bottom of the fuselage, were handcrafted by Heflinger.

A 20-gallon auxiliary gas tank has been added under the rear seat and the accessory controls and the entire instrument panel have been changed to suit Captain Heflinger's airline background of more than 26,000 hours with United.

All engine starting knobs—primer, mixture control, fuel pump, and master switch—are at the far left of the pilot. The fuel selector valve remains where it was on the original model—just above the control panel on the glare shield and aft of the center of the windshield, where no one can move it accidentally. Conventional power controls are in the center of the panel, with carb heat at the left, throttle at the bottom of the panel and prop control just above it. The gear-up handle is directly above the pilot's control wheel and the flap switch is to the right of the copilot's control wheel. (Cessna, Beech, Piper and others, please note the pilot-engineering location of these key controls!) Heflinger designed special "drooping" control wheels himself (he's also an amateur sculptor) to provide maximum instrument visibility.

During our recent "class reunion" we made two photo flights to produce the cover on this issue and other illustrations. On the second photo flight, made from Brackett Field near Los Angeles, Heflinger radioed across to the Cessna 172 camera plane I was sharing with Dr. Joe Brammer (AOPA 438426),



Mel Heflinger wears a wide, self-satisfied smile as his Harlow climbs out at 1,900 fpm after takeoff. (Who says airline captains never smile?) Plane cruises at over 150 mph.



# HARLOW PJC-2



PJC-2, with "dive-bomber" perforated flaps and gear extended. Flaps extend from aileron to aileron, are "strictly for high drag and are not used for takeoff."

and advised that he had a rough engine. We terminated the photo flight and returned to Brackett, where Captain Heflinger informed the tower that "We seem to have a problem." The Harlow quit cold during rollout and subsequent investigation showed the No. 6 cylinder had "swallowed a valve." The badly mashed piston has since been cut in half for bookends, while the equally mutilated cylinder and head will become a flower planter at the Heflinger home. The airline captain said the only known source of parts for this orphan engine (hasn't been built since 1950) is Paul Dailey, located adjacent to International Airport, at San Antonio, Tex.

When we flight-checked the historic Harlow, we met Heflinger at the Torrance (Calif.) Airport, where it is based. The owner's son Dan, 22, went along in the back seat.

The PJC-2's front seat is adjustable, all at once. Thus it was a compromise between my long legs and Mel's shorter ones, but the farther the front seat goes forward, the higher it goes. We compromised by having me fly in a somewhat cramped position to improve over-the-nose visibility.

Actually, the PJC-2 isn't really blind ahead. The Cessna 195, Howard, and Staggerwing Beech have much more restricted visibility. The Harlow is, however, a bit blind to the far side of the radial cowling, when compared with today's "nose-draggers." Heflinger advised a trigeared version of the Harlow was, at one time, on the drawing boards but it was never built.

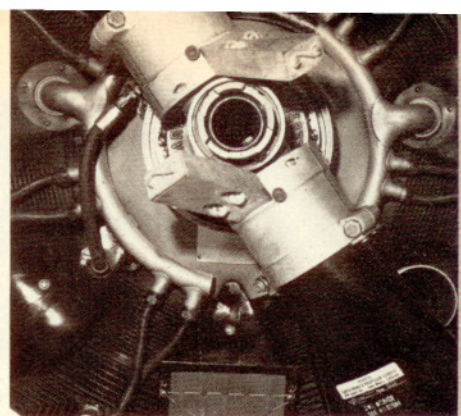
We taxied out slowly, swinging the nose from time to time to assure a clear field. Runup was completely conventional as we asked about liftoff speeds,

possible trim changes as the gear came up, and power reductions. Perforated flaps, which stretch from aileron to aileron, are strictly for high drag and are not used for takeoff. These flaps are similar to those used on WW-II dive-bombers.

Torrance Tower gave us the word and we lined up carefully down the middle of long, wide Runway 29R. (No matter how many times you've done it, there's always a guessing game on your first takeoff with a tailwheel aircraft.) We had a slight crosswind from the left that increased the ship's inclination to turn left; so, it was no surprise that we needed full right rudder and a little nudge on the right toe brake to keep the big nose up-front as the tail lifted clear of the runway. Once lateral control had been established, it was just a question of letting the "old girl" pick up speed and fly herself off the runway. Since the ship stalls at an indicated 57 mph, she also broke ground passing through 60-65 and we let the speed build up to an engine-cooling 90 mph as the gear came up. The retraction cycle takes 11-12 seconds.

Climbout is fabulous! It's something you tend to forget with some of today's low-powered, small-winged models that are designed more for top speed than for climb performance. With a full load, rate of climb (r/c) with the big 550-cu-in. 185 hp Warner is 1,500 fpm, but at our lighter weight, the r/c needle was flirting with 2,000 fpm! At that angle, visibility over the nose was not so good, but it was no problem to see around both corners and make a turn every few seconds to assure no one was ahead of us.

Control forces are all smooth, though there is limited aileron to nine degrees up and eight degrees down. Heflinger said the small amount of aileron was dictated by the area of movement for the balance weights within the wing. He also said he has rolled the ship easily and even done acceptable eight-point rolls.



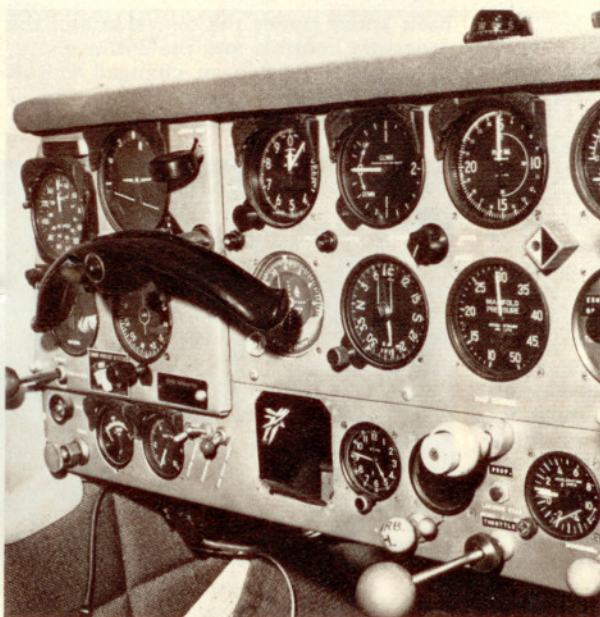
Hartzell Selectomatic prop on PJC-2 is one of modifications owner has made in the original No. 1 production Harlow. Prop is hooked to a 185 hp Warner, which replaced aircraft's standard 145 hp Warner. Photo at right shows what happens when a 550-cubic-inch Warner "swallows" a valve. Top of piston was pounded into this shape before broken valve went out the exhaust port.

At this point, it should be mentioned that Heflinger was an aerobatic instructor at the Tex Rankin school for nearly four years during World War II. He qualified some 100 students in the sometimes-tricky Stearman PT-17 without ever having a student groundloop and break a spar, or having it happen to him while giving dual! (Is there any other Stearman instructor who can top that?) In teaching 25 USAAF Cadets myself, I finally managed to let one get far enough away from me (dual with a student), so that it was either go over or go-around. We went around. (That was the only military aircraft I ever damaged, and those ripples working their way up the lower wing made a memorable pattern in my brain cells.)

But back to Heflinger's Harlow.

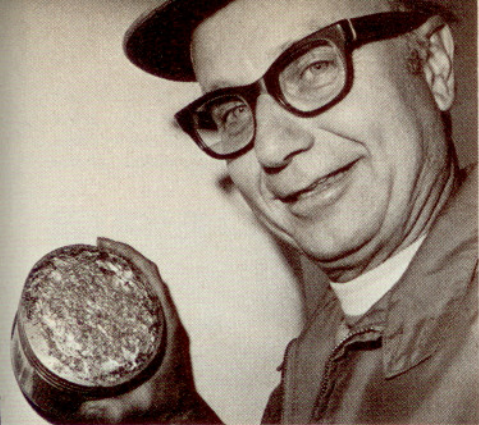
Visibility is excellent in level flight. Stalls are firm but preceded by a warning buffet. The PJC-2 is placarded against spins, and we didn't have a spin chute (nor "people" chutes) so we didn't.

After N18978 had been certificated by the old CAA, FAA's predecessor, a company was formed at the old Alhambra (Calif.) Airport and either nine or 10 PJC-2s were built. One of the pri-



"Fail-safe" panel and instrument installation made by United Air Lines Captain Heflinger. Engine starting instruments and controls are at the bottom left (mixture control at far left, starter and primer below it, then master switch, generator and fuel pump). Gear handle is out of the way, above the control wheel, and gear-down light is to the left, at the top of the panel directly in front of the pilot. Flap handle is to upper right of the control wheel and not shown in the photo. (Glideslope indicator "is a phony—a paste-in until Heflinger can purchase the real thing.") Heflinger, an amateur sculptor, designed the special "drooping" control wheels himself for maximum instrument visibility.





Marshall, now assistant to the vice president of flight operations for United Air Lines, and Rex Hume, customer service engineering representative for McDonnell Douglas, were involved with the early stages of restoration but they were transferred out of Southern California and the Torrance area, and the final work was accomplished by Mel, his wife Dorothy, (who flies with "sweaty palms and white knuckles") and sons Nick and Dan. Heflinger estimates at least 10,000 hours of work in the restoration.

Our flight check continued in the immediate vicinity of the friendly Torrance Airport. Application of the perforated flaps that cover the entire trailing edge of the wing (less ailerons) and extend below the fuselage section produces a fairly steep nose-down glide and a somewhat more abrupt-breaking stall. Since these "dive-bomber" flaps just create drag, a flaps-down stall is only about 3 to 4 mph slower than in a clean configuration.

After we'd explored all the normal flight characteristics, we leveled out for a cruise-power setting of 1,800 rpm and 23 inches at 4,000 feet. The airspeed crawled up to 130, producing a true cruising speed of 147 mph. (Not bad at all for an "old girl" designed and built 35 years ago!)

Then there comes that moment of truth that you face with any new-to-you aircraft, and it can be an interesting moment with a "taildragger." You have to prove that you can land the thing without bouncing it hangar-high on an ill-timed wheel landing, or dropping it in from a full stall. Then there's the cat-and-mouse game keeping the front end up-front during rollout, so that you don't groundloop.

N18978 had dual brakes, with Heflinger doing his usual airline captain job of careful monitoring, and there wasn't really ever any problem. On let-down, we throttled back to where the horn blew (15 inches) and dropped the gear to keep things quiet in the cabin. Heflinger has a push-to-silence override



mary stockholders at the time was Howard Hughes, since designer Harlow had worked as a consultant on the Hughes H-1 racer. As a motion picture promotion, a starlet named Jean Harlow flew in the No. 1 production Harlow aircraft.

Price of the all-metal PJC-2 was \$6,995 in 1940, with the first six going to the CAA. During World War II, the No. 1 PJC-2 and three of the other Harlows were "drafted" as light transports and instrument trainers for WASPs (Women's Auxiliary Service Pilots) at Love Field, Dallas, Tex. They carried a military designation of UC-80.

After the war, incomplete logbooks show that Heflinger's Harlow was sold as surplus, went to New England, then finally came to rest in Texas, fresh out of engine and TLC. Convair engineer Joe Gillbo bought the package in Breckenridge, Tex., and John Dagle (AOPA 98065) of San Luis Obispo, Calif., now owner of Harlow No. 9, ferried the ship back to San Diego on an FAA ferry permit. Research indicates, however, that just about the only things hooked up properly were the mags. The gear was down and locked, with the wheel wells taped over; the oil tank was in the copilot's seat, with lines running through the firewall; and the instrument panel kept falling out of place.

N18978 was quickly grounded in San Diego and had to be trucked to Torrance when Heflinger and two other pilots bought it in September 1961. Al

switch that is spring-loaded and must be held down for extended low-power glides with the wheels-in-the-wells. From our previous stalls, a comfortable flaps-down approach speed seemed to be 80 mph. Predictably, I was closer to 90 indicated, so we did eat up more of the runway than the Torrance Tower operators are accustomed to seeing the Harlow use. Heflinger says that when he works at it, he can land and turn off in 600 feet, if the plane is at full load.

I'd misjudged our height by about a foot on what would have been a three-point landing. We skipped back into the air and I added just a whisper of power to ease us back down for touchdown No. 2. Directional control on rollout was no great problem, since the gear tread is 7-feet 7-inches and brakes were good.

While we taxied slowly back to Heflinger's hangar, Mel pointed out that at least four of the original nine or 10 PJC-2s are still flying or are in the process of being restored—35 years later! Senior American Airlines Captain Rod Kesting (AOPA 163049) has No. 3 in Lynnfield, Mass.; Dr. Dave Callander of Denver has No. 6 (formerly NC-15); John McPherson has No. 7 in Salinas, Calif.; and John Dagle is restoring No. 9 in San Luis Obispo, Calif.

As we climbed out of the ample cabin and tailed N18978 into the hangar beside an ever-increasing stack of trophies, I noticed a dayglow sticker on one of the rafters. Originally, it had said "I'd rather be flying a taildragger." Heflinger had corrected the statement to read, "I'd rather be flying *this* taildragger."

It was an interesting mini-reunion for part of the PJC class of 1936. □