

The Importance of Parachute Maintenance

As Told to Robert Lewis by J. FLOYD SMITH

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Parachutes: Development, Use, Maintenance, written by J. Floyd Smith, and published in 1942, continues to be one of the foremost manuals on this subject.

—EDITOR'S NOTE

JUST AS IN THE CASE of surgeon's instruments, the parachute deserves and needs the best care possible in order to function properly in its vital lifesaving role.

While it is by no means delicate or frail (for it must be able to withstand terrific strains) the parachute nevertheless must be maintained in top condition to fulfil its purpose without a moment of advance warning. The pilot, the bombardier, the gunner, the navigator, in fact all the men who fight this war from the skies, never know in advance when they will have to bail out. Their best friend is the pack strapped to their backs.

Their chutes must, actually, perform in the kind of manner that merits the praise of war heroes such as Maj. Joseph Foss, U.S.M.C., who said recently, "In all my time at Guadalcanal I never knew of a parachute failure."

A proper maintenance station should include the following facilities and equipment:

1. A clean, dry well-lighted room at least 12 ft. wide by 60 ft. long or 18 ft. wide by 50 ft. long. At least a part of the ceiling should be not less than 25 ft. high for hanging and airing parachutes. Small lines such as 1/4-inch sash cord should be properly installed on pulleys for hanging chutes. Means of drying the air in the room should be provided in excessively damp climates.
2. A table 36 in. wide by 45 ft. long by 37 in. high, with 4 in. x 18 in. drawer. All external surfaces should be perfectly smooth.
3. A rigid bench 2 ft. by 4 ft. by 34 in. high, with tool drawer.
4. Light bench vise with about 2-in. jaws and 1/8 in. copper jaw guards.
5. Hand tools such as light rivet hammer, compound parallel pliers, small snipe-nosed side cutting pliers, round awl, files, soldering iron, dies for Lift the Dot fasteners, grommet dies, tubular punch dies for Duro Dot fasteners, hand sewing needles size 0 to 6, sewing palm, hand seal press, packing hook, smoothing stick, bees wax, various thread, etc.

6. Three 10-lb. shot bags.

7. Singer Sewing Machine No. 95-100 with needles Nos. 14, 16, 18, 22.

THERE ARE CERTAIN FUNDAMENTALS which should be adhered to in servicing and packing parachutes and only qualified persons should do this work.

Before a parachute is packed for service it should be established by proper inspection that all of the parts are in proper condition for service. The parachute should be safe for use at high speeds even if it is to be used in a low speed light plane. Through collision or otherwise, a



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Inventor of the "Free Type" Parachute

low-speed plane may lose its wings and the parachute may have to be used at high speed. Proper condition means *all* parts, especially the harness.

A parachute canopy may have holes, rips and tears in it and be safe for use at high speed. Again it may appear to be in good condition but be weakened by mildew or acid fumes. Harnesses are often used long after the webbing has deteriorated to a fraction of its original strength. A harness is seldom safe after three years of service, and sometimes two years is its limit. The life of a silk canopy and lines

may be anywhere from a few days to ten years, depending on its use and care. Only special adaptability, training and experience can qualify a rigger to determine whether a parachute is in proper condition. This ability cannot be gained from reading a book, so it is useless to enlarge upon the subject here.

Many other parts of the parachute also require close scrutiny to determine their fitness. A faulty pilot chute frame, cone, grommet, housing, ripcord or pocket may be dangerous. It requires less than five minutes for an experienced inspector to inspect a parachute which is in good condition. It may require an hour to inspect a parachute which is in poor condition.

An inspection sheet or book should be used where maintenance of service parachutes is done. Each item of inspection and servicing should be checked off, repairs required noted and checked when completed and general condition and recommendations noted.

Stretch parachute full length. See that canopy is right side out. Remove any twists from lines and harness risers. Anchor peak of canopy and seat of harness.

1A—Examine harness webbing for brittleness, abrasions, acids or rust stains, shearing at fittings. Examine all springs or mechanisms in attaching fittings.

1B—Examine stitching, especially at points of attachment.

1C—Examine pack attachments, line retainer means, grommets, cones and their attachment, housing and attachments to pack and harness, rip cord handle pocket and its attachment and pack elastics.

1D—Examine rip cord—all parts.

2A—Examine lines and their attachments to harness and canopy.

3A—Examine each gore or section of canopy including fabric, seams and hems at vent and skirt. This can best be done by grasping two adjoining lines at skirt and lifting and spreading entire gore. Acid stains will show as brown spots which turn into holes within a few days. Acid cannot be washed out and affected areas should be removed, except in emergency, when temporary neutralizing means consisting of sponging with a weak solution of ammonia may be used. Insect stains sometimes appear similar



THEY MIGHT BE DESIGNING A ROYAL ROBE, BUT THEY ARE DOING BETTER THAN THAT Adeline Gray, Famous in This Country as a Parachutist, is Now Employed as a Rigger at Pioneer Parachute Company, Where She is in Charge of the Repair Department. She Looks After Parachutes Belonging to Civilians and Flying Schools. In This Picture She is Examining Vent of Canopy While Assistant at Right is Inspecting the Stitching

to acid stains, but may be washed out. If in doubt, make a test with litmus paper.

3B—Examine vent chimney, especially rubber ring by stretching open to full extent. If elastic is weak or broken, change it.

4A—Examine pilot chute, especially rib pockets, hinge fittings and spider if umbrella type is used, lines and tie on loop.

REPAIRS ARE USUALLY CLASSIFIED IN TWO TYPES, namely, Minor and Major.

Minor repairs consist of repairing stitching, patching holes of less than 12 square inches in area, patching rips and tears, cleaning, replacing vent rubbers, pilot chute, pilot chute frame, rib pockets, bridle cord, break cords, static line, pack elastic, pack stiffeners, elastic eyes, cones, tabs, housing, grommets, line retainers, snap fasteners.

For servicing and minor repairs a rigger should have a suitable warm dry room, a long smooth-topped table, proper grommet set, round awl, palm, bees wax, size A, B, and E white silk thread, size E silk thread color O.D., silk thread to be in accordance with U. S. Federal specification VT-301, size 16 3, 30 3 5 cord, 8 cord, and 9 cord natural linen thread, in accordance with U. S. Federal specification VT-285, hand sewing machine, parachute seal press and customary packing tools.

In an emergency a practical person can make safe temporary minor or major repairs with hand-sewing needles, suitable materials and the ability to duplicate the various structures.

If the damaged areas are large and the materials and equipment are available, remove the damaged panels or sections by picking out the stitches, and replace with duplicate pieces. In patching holes and tears, cut off ragged edges, lay the damaged section out flat, match a duplicate material overlapping the edges $1\frac{1}{2}$ inch and paste to the canopy material with flour or library paste.

It is important that the filling and the warp threads of the patch match the corresponding threads in direction of lay. Turn edges of patch under about $\frac{1}{4}$ inch and stitch down with size A silk thread 12 stitches per inch. Turn the section inside out and stitch edges of hole to patch. Stitch again half-way between the previous stitches. Rinse the paste out with pure cold water. It has been customary with many riggers and factories to use two patches, one outside and one inside, but such practices are entirely unnecessary and in some instances is a hazard.

If the hem reinforcement is broken, open the seam 15 inches each side of break and lap 24 inch new reinforcement in and stitch as original.

Slips in cloth often appear to be stains or water marks. Twill weave silk has a greater tear strength than taffeta weave because it slips easier. Normal slips can be removed by skilled manipulation of the threads with a pencil eraser, a smooth coin edge, or a finger nail. Major slippage in seams can be removed by picking stitches, removing slippage and resewing. Slips do not affect strength unless threads are broken.

In emergency a suspension line may be spliced by lapping 2 inches and zig zag sewing together 44 stitches per inch, or 11 stitches per inch as counted on one side.

If the webbing is badly chafed, hard or brittle, or is shearing at fittings, it should be replaced. When repairing harness stitching, thread the same as original should be used. Use two blunt pointed needles if repairing by hand, passing needles in opposite directions through each hole. Any cracked or bent fittings should be replaced.

ALWAYS MAKE CERTAIN RIPCORD HOUSING and handle pocket are securely attached in the correct locations, and that the ripcord and housing are properly matched. The housing must be shorter than the ripcord in order to prevent a possible premature or accidental release. There are many combinations and lengths of ripcords and housings, and there have been instances in which the wrong length housing was placed on packs. There have been other instances in which the housing was moved away from the pocket or the pocket was moved away from the housing so that the ripcord would not have to be pushed into the housing under a strain, or in order to prevent the handle from falling out of a loose pocket. If the ripcord cable birdcages under the end strain, get a new ripcord if strands are broken. Otherwise it is O.K.

Ripcords should never be repaired except in a definite emergency. If it is necessary to replace cable or pins, only duplicate aircraft cable and hard temper aircraft wire or hard music wire should be used. If pins can be bent with small pliers, they are too soft. A soft pin may bend in a grommet and prevent release of parachute. After soldering, fix end of each pin in a vise and pull 200 lbs. on handle. Pins are made for this purpose and cut and dressed to length after test. After ripcord is placed in packed parachute with handle in pocket, grasp har-

ness close to pocket and pull 50 lbs. against pack. The housing should take this pull without breaking the safety thread on ripcord. Replace the ripcord at first opportunity.

If there is any possibility that static line is in weakened condition, it should be replaced by a new one. If necessary to repair, make certain the repaired line has a minimum strength of 1,500 lbs. Static lines have been broken by the person rolling into it, and the parachutes were not removed from the pack.

NEVER GUESS OR HASTILY DECIDE that the job is good enough. Improvise ways and means of testing and proving it.

A slightly soiled parachute is satisfactory without cleaning. Acid is the arch enemy of parachute fabric. All ink removers and nearly all other spot removers contain acid. Soap is also hard on silk. Shake the canopy to remove dust and loose dirt. If a parachute is washed, only pure clean fresh water should be used. Do not rub or brush. Agitate the water and rinse by alternate submersion. The water may be warm but not hot. The above directions include the removal of mud. To remove light oil or grease stains, place a clean undyed pad of felt or cloth underneath the soiled spot. Lightly saturate a clean undyed soft cloth with Carbona and lightly brush the soiled spot in a rotary

motion, starting at center and increasing the size of circles.

For heavy grease stains, use Nactol.

If oil or grease areas are so large that these methods are impractical Benzol is sometimes used. Do not rub. Immerse the stained areas and agitate the fluid and rinse.

Stains such as red clay, grasshopper, grass and blood which cannot be removed by the above methods can be cleaned with pure cold water and pure olive oil soap or pure 10 titre red oil soap. Rinse thoroughly in pure clean water. These soaps must contain not more than 10 titre. The above noted lightly rotary brushing motion with a soft cloth can be used for spots, or the entire parachute may safely be washed by spray or rinse method. Finish by rinsing thoroughly in pure clean fresh water and hang up to dry.

Salt water—alkaline water. If a parachute has been in contact with salt or alkaline water or in stagnant water, even if only a light spray, it should be repeatedly rinsed in pure clean fresh water. If salt water has dried on the parachute, it should be soaked two or three hours before rinsing. Never hang a parachute in the sun. When a parachute is hung up to dry or air, it should be suspended by the bridle lines.

To remove large blood stains, soak two hours or more (depending on the set of

stain) in pure lukewarm water and rinse. If necessary, repeat. If not cleaned, try olive oil soap as noted above or send to a silk mill or a manufacturer who is equipped for such cleaning.

When not in use a parachute should be kept in a cool, dry place entirely removed from any possible acid fumes such as from batteries or soldering work. If the parachute is not in use for more than a day, unhook the elastics. If the period is more than a week, pull the rip cord and hang the chute up or shake it up in the traveling bag. If the climate is exceedingly damp and humid, mildew may be prevalent. In such instances when air conditioning and humidity control is not available, the parachute should be placed in a right bin well above the floor and away from any wall and one or two pounds of naphthalene flakes in a suitable dispensing container placed underneath. Under extreme climatic conditions, a small amount of naphthalene flakes may be sprinkled directly upon the canopy and the traveling bag closed over it. This may also be advisable when packing the parachute. Never place the parachute over any kind of heating apparatus to dry it. A parachute in storage should be examined at least each 30 days. When placing parachute in traveling bag or storing in unpacked condition, no metal parts should be in contact with the silk.

They Christened Her "Whistling Willie"

CAPT. BERNARD BROOKES

SHE WAS A DOUGLAS built transport, DC-3. She'd been doing service for the China National Aviation Corporation and had been put up for repairs—one engine needed replacing. So she was waiting in the CNAC hangar in Hong Kong when the Japs, just before the raid on Pearl Harbor, came down at dawn.

Not the best kind of craft with which to take a chance, but anything with wings was worth chancing, with hundreds of women and children to be evacuated ahead of the Japs who murdered, mangled and defiled everything before them.

Capt. Harold Sweet was the pilot who'd long taken her up and put her down, so he took the chance—wheeled her out and got her one engine going. Fifty-four evacuees were loaded in and the plane took off. She barely made it across the border into Free China when she coughed and gasped and came down in mud two feet deep.

Nothing would move her to renewed effort and the crew and passengers worked feverishly to cover her with a camouflage of leaves and boughs.

Even so, the Japs discovered the plane and

machine-gunned her until they ran out of ammunition. Later it was discovered that there were 3,000 bullet holes in the fuselage and wings.

Captain Sweet, knowing that the miracle man, Zed Soldinski, maintenance chief of CNAC could make anything fly, radioed for him to come down from Chungking.

Soldinski patched up her innards, while the crew glued pieces of awning with Chinese home-made glue over her three thousand wounds.

The refugees took off. Promptly they ran into a terrific rain storm which washed off the patches and the wind now whistling through the 3,000 bullet holes made such a howl that the Jap airmen, attracted by the noise, were frightened off—this shrieking thing was something the like of which they'd never encountered. So the plane set down her harassed crew and passengers in Chungking.

Charles (Chuck) Sharp, operations manager, flew the riddled plane down to India for reconditioning. Coming in, he radioed for landing and got back this, "Why bother with the radio? We heard that Whistling Willie coming fifty miles off."

Thus she got her name.

And she got a new lease on life.

"Whistling Willie," in new plane shape, is carrying passengers and freight on regular schedules in the Air Transport Service.

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Praise from Sir Hubert

MAJ. GEN. DAVENPORT JOHNSON, Commanding General of the Second Air Force, announced last month that he had received a letter from Maj. Gen. Ira C. Eaker, Commanding General of the Eighth Air Force in England, highly praising the thoroughness of the training given our men in the Air Forces. Gen. Eaker said:

"Last night I went to see the new Group Commanders and talked to them. They had just finished their theater familiarization training and they are out at this hour on their first mission. Yesterday, their ground echelons arrived and, all in all, everything is rolling and morale is high. From the reports of the Wing Commanders and from those of the old Group Commanders this new bunch is a superior outfit."