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REPORT No: FA.278/3
TECHNICAL NOTE No: PH.381

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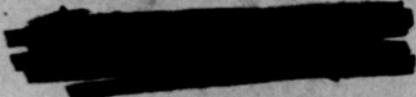
ATI No. 9237

ROYAL AIRCRAFT ESTABLISHMENT
Farnborough, Hants.

JAPANESE AIRCRAFT CAMERAS

by

F. SPENCER



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Report No. FA.278/3
Technical Note No. FH.381
September, 1946

ROYAL AIRCRAFT ESTABLISHMENT, FARNBOROUGH

Japanese Aircraft Cameras

by

F. Spencer

R.A.E. Ref: RH.3001/1/93

SUMMARY

The note comprises a general description of ten different types of Japanese aircraft cameras. The descriptions are brief because the cameras have been designed around standard principles and existing cameras from other countries and are consequently of no real investigational value. One or two types of more recent design have however been described in greater detail.

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1 General Description

1.1 Camera Type G.S.K.99
(See Figs.1 and 2)

The Japanese Type G.S.K.99 camera is intended for use in the air only since it is of the fixed focus type, being focussed on infinity. It is a fully automatic hand held oblique camera, i.e., a clockwork mechanism is embodied in its design which automatically winds the film over and sets the shutter. When the mechanism is fully wound sufficient power is preserved to wind over satisfactorily six exposures although twelve cycles can be performed with one winding when the camera is tested without film.

The camera does not compensate for picture spacing, consequently the spacing between the exposures increases progressively as the film is transported through the camera.

The shutter is a copy of the Compur type but of a less complex design, having three speeds only and no time or bulb setting. The omission of the time setting prevents any periodical visual focus checks being made to the camera. The shutter is set by the clockwork mechanism through the rotation of a cam and is released manually by the push release at the top of the camera. The speed and aperture settings are adjusted around the lens cone by sliding spring loaded levers which read against two scales.

A direct vision optical frame sight is provided on the top of the handle grips bracket.

The handle-grips-bracket is detachable to enable the camera to be fixed to an aircraft bracket and, by means of the bowden remote release mechanism, a series of overlapping obliques can be obtained. The number of exposures made is recorded through a small aperture on the underside of the camera body.

The film carrier serves two purposes

- (a) acting as a back cover for the camera and
- (b) as a carrier to which the "feed" and "receive" spools are attached. Spare carriers are provided with the camera which are intended to be loaded before flight; these are provided with safety covers to prevent damage to the film during stowage in the aircraft.

The general characteristics of the camera are as follows:-

- (a) Size = (including hand grips) 8" x 6" x 5".
- (b) Weight = 4½ lbs.
- (c) Shutter = Pre-setting automatic "Compur" type inter-lens shutter
- (d) Speeds = 1/100th, 1/200th and 1/400th second
- (e) Lens = 7.5 c.m focal length, F 3.5 Aperture "Hexar" Tokyo
- (f) Format = 2.2" x 2.2"
- (g) Film = 10 pictures on standard 120 film.

1.2 Camera Type S.K.100
(See Fig.3)

This Japanese camera is mainly intended for oblique photography but is fitted with a camera mounting ring which enables it to be mounted in a fixed position for vertical photography.

There is nothing outstanding in the design of the camera but an interesting feature is the double extension lens hood, which consists of two tubular castings the inner tube interconnected with the outer by pins and spiral slots which enables it to be rotated outwards thereby lengthening the cone to shroud the longer focal length lens.

There are two alternative lenses with this camera which are attached to the camera cone by bayonet fittings and are interchangeable, a 20 c.m. straight and a 40 c.m. tele-photo lens.

The shutter is of the fixed slit focal plane type, with behind-lens-flaps serving as a capping device while the shutter is being set. The exposure speed is made variable by adjustment of the main blind spring by a knob on the side of the camera, the speeds being indicated through a small aperture.

The body of the camera accommodates the "feed" and "receive" film spools and are carried in spool dogs. The film is wound over by a direct gear train from the winding knob, no metering roller being used, and there is no initial friction loading on the "feed" spool. The absence of a metering roller or film measuring device causes the spacing between exposures to increase progressively as the film passes through the camera. A counter on the side of the gear box indicates the number of exposures made reading up to 40. To remove the film spools "pull out" spool dogs have been provided at one side of the camera and are of simple but very effective design. The lever springs for locking the dogs in position are vulnerable as fitted to this camera since they are exposed outside the camera but where the spool dogs are fitted to a film carrier which is housed inside a magazine cover this method is simple and recommended.

A heating element is fitted inside the camera body and is controlled by a thermostat switch when switched on by the main supply switch which is on the outside of the cone.

Hand grips are fitted to each side of the camera which enables the camera to be held comfortably in the oblique position. A shutter release trigger is adjacent to the index finger on the right hand hand-grip.

The general characteristics of the camera are:-

- (a) Height = $11\frac{1}{2}$ " or $14\frac{1}{2}$ " cone extended
Width = 15" x 10" including handgrips
- (b) Weight = 15 lbs.
- (c) Shutter = Fixed slit focal plain fabric shutter
- (d) Speeds = $1/150$ th, $1/200$ th and $1/300$ th second.
- (e) Lens = Tele-Hexar 40 c.m. F 5.6
- (f) Format = 15 x 12 c.m.
- (g) Film = 18 c.m. wide taking 40 exposures

1.3 Aircraft Camera, Type Unidentified
Packing Note reference Type 96 Camera
(See figs. No.4 and 5)

This camera is presumably intended for oblique and vertical photography. It is fitted with a recording clinometer and level which projects a small image in two corners of the picture format; one showing the inclination of the camera, in degrees, when used for oblique photography and the other showing the level of the camera when used as a vertical camera.

A system of recording collimating marks on the film are fitted. This consists of four miniature convex lenses fitted to the four sides of the camera body aperture which are focussed to the focal plane, thus when an exposure is made by the main lens, light striking these miniature lenses is converged to record a dot at the centre of the four sides of the exposure, the intersection of the four dots fixing the centre of the format. No adjustment is provided for setting up the lenses accurately. Since the camera is fitted with collimating devices it implies that the resultant photographs are intended for use on photogrammetric work but would be of low accuracy.

The camera is fitted with an inter-lens shutter closely resembling the types as used in the Fairchild K.20 and K.8.AB cameras, and has a "Mikkor" F 4.5, focal length 179.9 mm lens.

The right hand grip of the camera can be rotated through an arc of approximately 90°, which operation sets the shutter only.

The camera is provided with a detachable film magazine and/or detachable plate changing boxes. The magazine capacity is 40 exposures and the plate boxes 6 plates per box. The film has to be wound over after each exposure independently of the shutter setting hand grip by rotating a knob on the magazine. Both the magazine and plate changing boxes are exact copies of the German Zeiss magazine and changing boxes. Changing boxes of this type are known to have been used extensively in the 1914-18 war.

The camera is supplied from a 24 volt supply for two heating elements inside the body and also for the instrument lamps. The exposure of the instruments is controlled from an electrical wipe inside the shutter assembly so that the instruments are recorded simultaneously with the main exposure.

A frame sight is provided and can be folded when not in use. There is also a metal ring around the cone of the camera for seating into a mounting for vertical photography.

The main characteristics of the camera are as follows:-

- (a) Height = 12" Width = 12" x 9" including handgrips
- (b) Weight = 21 lbs.
- (c) Shutter = Inter-lens type
- (d) Speeds = 1/100th and 1/150th second
- (e) Lens = "Mikkor" F 4.5, Focal length = 179.9 mm
- (f) Format = 16 x 11.5 c.m.s
- (g) Film = 18 c.m. wide taking 40 exposures
- (h) Supply = 24 volts D.C. for heaters only

1.4 Aircraft Camera. Type Unidentified
(See Figs.6)

This camera is designed for oblique or vertical photography and is literally a copy of an early Fairchild hand held oblique camera. There are no outstanding features on this camera.

It can be hand wound or electrically driven, and for vertical photography an intervalometer can be coupled electrically to the camera having an interval range from 6 to 75 seconds, stopping up in increments of three seconds. This intervalometer is a copy of the Fairchild B2 type intervalometer.

Although the lens components of the shutter unit were missing it is estimated that a lens of 20 c.m. focal length was used and the aperture adjusting knob indicates a maximum aperture of F 4.5.

When operating the camera by hand the winding handle can be hinged out and rotated, thus winding the film and setting the shutter.

When operating electrically, the motor which is embodied inside the camera provides the power for winding the film and setting the shutter.

The film is held flat during exposure by suction from the pressure plate in the magazine.

The winding of the film in the magazine is controlled by the metering roller which, being driven by the film, performs one revolution and by a system of levers de-clutches the "take up" spool driving dogs from the main drive. A counter is also incorporated which reads to 200 exposures and automatically returns to zero when the magazine cover is removed. The magazines are interchangeable on the camera.

The main characteristics of the camera are as follows:-

- (a) Height = 16" (including magazine) Width = 12" x 10"
- (b) Weight = 25 lbs
- (c) Shutter = Inter-lens type
- (d) Speeds = $1/50$ th, $1/100$ th and $1/200$ th second
- (e) Lens = Missing. Probably a 20 c.m. F 4.5 lens
- (f) Format = $6\frac{1}{2}$ " x 7" approx.
- (g) Film = 7" wide, taking 200 exposures
- (h) Supply = 24 volts

1.5 Aircraft Camera (Type Unidentified but titled on packing note as Hand Held F 8 Camera).
(See Fig.7)

This camera is intended mainly for use as a hand held oblique camera, but has fittings which can be attached to the camera for mounting it in a vertical position for fixed vertical photography.

The lens, being fitted to a sunk mount focussing ring enables the camera to be used at short range for ground use, a scale of distances in metres being engraved for that purpose on the focussing ring around the bottom of the lens cone.

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The camera is primarily a roll film camera but has a special plate changing box adaptor to which the Zeiss type changing box can be fitted.

Hand grips are provided to enable the camera to be held at an oblique angle, adjacent to which is the trigger release for the shutter. The film and shutter is wound over by a winding knob on the right of the camera.

The shutter is a focal plane multi slit type having three slits, and by adjustment on the spring tension of the shutter a combination of six exposure speeds can be obtained ranging from 1/60th second to 1/400th second.

Two sights are provided, one being a rectangular frame sight for use in the air, and the other a negative lens rectangular frame sight for air or ground use, having a parallax connection line engraved on the lens.

The camera generally, is an exact copy of the Fairchild K.10 aerial camera, with the exception that a greater range of shutter speeds are obtainable by virtue of the multi slit shutter as against the single slit shutter of the K.10.

The general characteristics of the camera are as follows:-

- (a) Height = 13 $\frac{1}{2}$ ". Width = 8" x 9"
- (b) Weight = 11 lbs.
- (c) Shutter = Multi-slit focal plane type
- (d) Speeds = 1/60, 1/100, 1/160, 1/250, 1/300 and 1/400th second
- (e) Lens = Hexar, Tokyo, 25 c.m. F 4.5
- (f) Format = 7" x 5"
- (g) Film = 50 exposures Daylight Loading 7" wide
- (h) Supply = Nil

1.6 Aircraft Camera (Type Unidentified)
(See Figs. 8, 9 and 10)

This camera has no resemblance to any known camera and presumably is purely of Japanese origin, with the exception of the shutter and lens which is a copy of the German Compur Shutter and Teasar lens.

Its use cannot be exactly determined but as it has a register glass graticule and a spirit level which is recorded on each exposure, it is presumed that the camera is mounted in a vertical position, and if the lens is calibrated, the resultant photographs could be used for measurement determination. Its purpose may have been for recording bombing practices.

The camera is a combined clockwork and electrically operated camera, the mechanism being remotely controlled either by a type of intervalometer or by a pistol grip control, either of which, completes a circuit to operate three solenoids in the camera; two solenoids to release each shutter and the third to release the clockwork mechanism which automatically winds over the exposed portion of film and places a new portion in the focal plane. The instrument shutter is an automatic shutter and therefore requires no pre-setting whereas the main image shutter is a Compur type shutter and consequently requires pre-setting;

this is done manually by a plunger on the side of the camera. The reason for this latter arrangement is difficult to understand since a simple train of gears from the clockwork mechanism could easily have been incorporated to re-set the shutter.

The intervalometer or remote electrical control consists of an escapement mechanism of comparable robustness to a car dashboard clockwork mechanism, which controls the time dwell before a relay is operated to fire the camera. The interval can be pre-set from 0 to 40 seconds and has to be pre-set manually after each exposure. On the front of the control there is a dial and pointer for indicating the interval, a main "on" "off" switch, a change over switch and an indicator lamp. Three electrical leads are led away from the control by normal plugs and sockets, one to the source of supply, one to the camera and one to the remote manual pistol grip. The control like the camera is supported on four rubber grommets to a metal base which is normally attached in the aircraft by bolts.

The pistol grip remote control consists of a casting, having a trigger release which when operated makes a common contact for the three solenoids in the camera. A small mechanical dwell mechanism is embodied on the side of the grip which is interconnected with the trigger and serves to hold the contacts together for three seconds, should the trigger be released too early for the build up time of the solenoids.

A maximum of five exposures only can be made after which the camera has to be recharged with a new film which is presumably daylight loading film.

There is nothing outstanding on the camera worth any future consideration.

The general characteristics of the camera are as follows:-

- (a) Height = 9", Length 12", Width 8 1/2"
- (b) Weight = 10 lbs.
- (c) Shutter = Compur
- (d) Speeds = 1/50th, 1/100th, 1/150th.
- (e) Lens = Hexar Series I 15 c.m F 4.5
- (f) Format = 18 x 10 c.m.
- (g) Film = 5 exposure daylight loading
- (h) Supply = 24 volts

1.7 35 m.m. Cine Gun Camera (Type number unknown)
(See Figs.11 and 12)

The camera described below is a clockwork driven cine gun camera of neat design and simple construction. It can be remotely controlled electrically by a push button and has a remote indicator unit to indicate the amount of film used and also a flashing lamp to indicate the satisfactory running of the camera.

The camera consists of an aluminium casting which houses the clockwork motor and associated mechanism. An aperture is provided on the upper side of the camera into which the 35 m.m. film magazine is placed. An all metal focal plane shutter is used in conjunction with a

mirror and 75 m.m lens, the mirror being necessarily interposed between the lens and shutter because of the design of the mechanism. A harmonising sight is fitted on the camera casting for aligning the camera lens with the aircraft sight. A manually operated push button is also embodied in the camera and a three pin plug for connecting up the electrical lead from the remote indicator.

The clockwork mechanism consists of a single drum spring which is about the same dimensions as a standard single drum spring in a gramophone motor and is wound up by a butterfly grip, to which are meshed a train of gears driving a film metering coupling and a "take up" spool coupling. Linked up with a crank on the gears is a lever system which engages with the shutter. An insulated cam is rotated one revolution per picture which actuates a set of contacts for operating the remote counter and lamp circuit.

The shutter is of simple design but is not novel. It consists of two metal plates, both having a slit about $\frac{1}{8}$ " wide and $1\frac{1}{4}$ " long. The plates are traversed backwards and forwards across the focal plane by a crank action by the lever system on the mechanism panel. Both plates run on two guide rods situated on each side of the camera mask plate, the upper plate of the shutter being driven by the crank pin and the lower plate being driven by the upper by means of a pin engaging in a slot in the upper plate. The lower plate being friction loaded to the guide rods does not start to travel until the pin on the lower plate has travelled the length of its engaging slot which has the effect of retarding the travel of the lower exposing slit thereby covering up the upper slit whilst the shutter is travelling across the focal plane ready for making the exposure on the return. The exposure is created by a similar movement in the reverse direction with the exception that a limiting stop, only allows the lower plate to stay at rest until both $\frac{1}{8}$ " slits come into line, when both pass over the focal plane together, forming one common slit through which the light passes.

The film magazines are interchangeable and are loaded into a chamber in the camera, the film being pressed in register by means of a metal pressure plate in the magazine against a glass graticule mounted in the focal plane on the camera mask plate. The magazine is built up from light metal pressings, screwed and riveted, the inner portion supporting a spring loaded pressure plate, and at each side of the plate is a guide roller and a sprocket metering roller. At each side of the bracket supporting the pressure plate is a spool holding dog which supports a "feed" and "receives" spool. These spools are similar in design to the Leica spools that fit in the Leica cassettes and hold the same amount of film i.e., approximately sufficient film for 36 exposures on standard 35 m.m cine film.

Spacing the exposures is operated by the standard system of over-driving the "take up" spool through a friction loading from the metering sprocket roller, the metering roller doing a definite number of turns per exposure and the amount of film fed off from the roller to the "take up" spool being taken up on the spool by the over-drive. As the diameter of film increases on the spool so the spool slips proportionately on the friction loading.

Each magazine has a safety sliding sheath which slides around the inner edge of the magazine and covers up the exposing aperture when not in use. The handle on the door of the camera magazine chamber is so designed to couple up to a dog on the magazine when fitted in the camera, and the action of turning the handle to lock the door to the camera also opens the safety slide of the magazine. Moving the door handle to open the door also closes the safety slide of the magazine ready for removal from the camera.

This camera was received with an incomplete mounting, but the part fitted to the camera has been designed on robust lines probably to withstand vibration from cannon firing aircraft.

The lens fitted is a Japanese Hexar Series II 75 m.m F 3.5 with adjustable iris diaphragm to F 8.

The camera appears to be of recent design probably towards the latter part of the war. The body is an aluminum gravity casting with metal pressing attachments. The clockwork mechanism appears to be a design which will withstand the conditions of service wear and tear, the gearwheels being mounted in bearing inserts on a mild steel panel. This mechanism panel is easily detachable as a unit but is not intended for interchangeability since it is doweled in position in order to pick up accurately with the spring drum pinion and shutter unit which are left in situ when the panel is detached. The electrical fittings appear to be the weakest part of the camera, some of the fittings being very much closer than $\frac{1}{8}$ " from the metal parts of the camera which is considered to be the minimum safe distance for R.A.F. aircraft equipment fittings.

The remote counter unit consists of a small rectangular case in which is housed a counter mechanism, a solenoid and indicator lamp. Like most of the Japanese camera equipment, the counter is spring operated and released electrically by the pulsing from the camera, the spring loading being re-set by the action of re-setting the dial before each flight.

The general characteristics of the camera are as follows:-

- (a) Dimensions = 8" x 4" x 3" (excluding mounting)
- (b) Weight = 10 lbs.
- (c) Shutter = Metal bladed focal plane type
- (d) Speeds = 6 frames per second (approx.)
- (e) Lens = Hexar, Ser.II. 75 m.m, F 3.5
- (f) Format = $1\frac{1}{8}$ " x $1\frac{1}{8}$ "
- (g) Film = Magazine loading 35 m.m cine film 36 exposures
- (h) Supply = 24 volts and clockwork motor

1.8 Japanese 35 m.m Free Cine Gun Camera (Type Number Unknown)
(See Fig.13)

The cine gun camera illustrated in figure 15, is intended mainly for training personnel in the handling of an aircraft machine gun on a hand operated gun mounting, but it can also be fitted in an aircraft as a fixed gun and remotely controlled by a bowden cable attachment, the camera lens being harmonised with the aircraft gun sights. A standard ring and bead sight is normally fitted when the gun is used in the free position.

The camera appears to be of fairly recent design and considering that in the last stages of the Japanese war it was found that in some instances hand operated gun mountings were still being used, it is more than probable that the design is new. However, since power operated turrets have completely superseded the hand operated gun mounting in the R.A.F. there is no reason for copying or considering this type. A general description of the camera is however given in order to retain a record of the camera.

Like most recent Japanese camera equipment, the source of supply is clockwork mechanism, having sufficient power stored to wind over 100 frames, each frame being $\frac{3}{4}$ " x 1" wide. The camera is cassette loaded, the capacity of the cassettes being equal to 100 frames of 35 m.m cine film, therefore the mechanism must be re-wound after each burst of 100 frames. The re-loading of the camera with a new cassette in the air would be difficult since the film has to be threaded in the normal manner, i.e. from the "feed" cassette around a sprocket wheel, through the film gate, on to the sprocket wheel again and finally into the "take up" cassette. There are no guide marks in the film chamber for ensuring the correct lengths of loops on entering and leaving the film gate.

The mechanism consists, in the main, of a 5" diameter barrel gramophone type spring which transfers the stored power through a train of gears via a snail clutch, the latter permitting the spring to be wound without driving the mechanism. Coupled to this is a "Weeder" type counter and a worm driven shaft which extends from the stock to the front of the camera linking up with the shutter and claw mechanism by another train of gears. About midway along the shaft another drive is taken away to a sprocket wheel inside the film chamber, the sprocket wheel being of the continuously driven type, thereby feeding the film into and out of the film gate at a constant speed, where the claw converts the continuous movement to an intermittent movement.

The shutter consists of a 3" diameter disc having teeth around its periphery which mesh up with the mechanism driving shaft. Two sectors are cut out of the disc, a 10° and 40° sector, the former for creating the exposure for the main image and the latter for recording the time from a watch.

The claw mechanism which is of the single tooth double sided drive type, is linked up with the shutter disc, the rotation of the disc imparting an oscillating movement to the claw. The teeth on the claw are withdrawn from engagement with the film at the bottom of the stroke by means of the claw driving pin riding along a sloping ramp.

The film gate is a spring loaded, hinged stainless steel bracket, an aperture being cut right through the framing area and fitted to and behind the gate is a silvered mirror set at 45° to the lens axis for harmonising purposes. The whole is encased in an aluminium casting finished with black crystalline paint.

Two lenses are fitted to the camera, the main image lens being a 75 m.m Hexar Ser.II with an aperture of F 3.5, and a 40 m.m Hexar Ser.I with an aperture of F 4.5 for recording the watch. Both images are recorded simultaneously, the reduced watch image being recorded in the rebate between the frames. The camera is operated by a trigger release, the taking speed being 10 frames per second. The duration of the operation is controlled by the time that the trigger is depressed. An automatic device is incorporated in the mechanism to stop the camera before the film runs completely out even if the trigger is still depressed. Provision is also made for opening the shutter in the midway position to enable a sight to be taken directly through the lens via the mirror.

The whole camera is considered to be well designed and workmanship of a good standard.

The general characteristics of the camera are as follows:-

Dimensions = 30" x 12" x 6" (including sighting rings)

Weight = 35 lbs.

Shutter = Rotating disc with 10° and 40° sectors

Speeds = 10 frames per second
Lens = Hexar Ser.II 75 m.m F 3.5
Format = $\frac{3}{4}$ " x 1"
Film = 35 m.m standard cine film taking 100 frames per cassette
Supply = Clockwork motor

1.9 Single Exposure Free Gun Camera (Type number unknown).
(See Fig.14)

This camera is a very early copy of the British Lewis Gun Camera known in the service as the "G" III free gun camera and used during the 1914-18 war for training purposes. There is nothing new in this camera. It carries a carrier on which the normal 120 film is loaded, taking twelve $2\frac{1}{4}$ " x $1\frac{1}{2}$ " exposures for each film.

The cocking handle winds over the film one frame each time it is worked and the trigger release makes one exposure each time it is operated, i.e., only one exposure is made irrespective of the time that the trigger is depressed. The image is superimposed with a grid from a glass graticule in the focal plane which enables assessment of the resultant photographs. A 28.5 c.m. F 11 lens is used on the camera with an inter-lens shutter.

Ring and bead sights are fitted for aiming the camera, the camera being pivotted on a hand operated gun mounting.

The general characteristics of the camera are as follows:-

Dimensions = 38" x 5" x 4" (excluding spare magazine film pan)
Weight = 20 lbs.
Shutter = Inter lens. approx. $\frac{1}{100}$ th second
Speeds = 1 exposure each camera operation
Lens = Optor 28.5 c.m. F 11
Format = $2\frac{1}{4}$ " x $1\frac{1}{2}$ "
Film = Standard 120 film taking 12 - 14 exposures
Supply = Hand operated

1.10 Single Exposure Fixed Gun Camera (Type Number Unknown).
(See fig.11)

This camera was designed about the same time as the free gun (fig.14) and produces one exposure for each practice shot.

It differs only in that it is intended to simulate a fixed gun in an aircraft and is secured usually on the outside of the aircraft wing, hence the streamlining. It is adjustable on its mounting for harmonisation with the aircraft gun sights and is operated by bowden cable remote controls.

The camera is almost a copy of the early British G.22 single exposure fixed gun camera, it performs the same operations, resembles the camera in shape and is fitted with a lens cap. A 13.5 c.m. "OKO" F 4.5

lens is used on this camera whereas on the British version a lens of approximately twice that focal lens was used.

This camera being of obsolete design has no photographic advantage or movements worth considering on future designs.

The general characteristics of the camera are as follows:-

Dimensions = 20" x 6" x 4"

Weight = 15 lbs.

Shutter = Inter lens type $\frac{1}{100}$ th second approx.

Speeds = 1 exposure each camera operation

Lens = "TOKO" 13.5 c.m. F 4.5

Format = $2\frac{1}{4}$ " x $1\frac{3}{8}$ "

Film = 120 film taking approx. 12 - 14 exposures

Supply = Remote manual operation.

Attached: Figs. 1 to 15

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FIG. 1 & 2

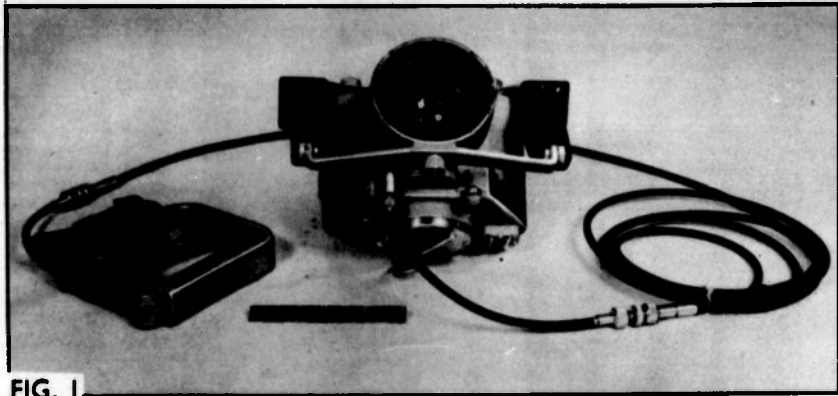


FIG. 1

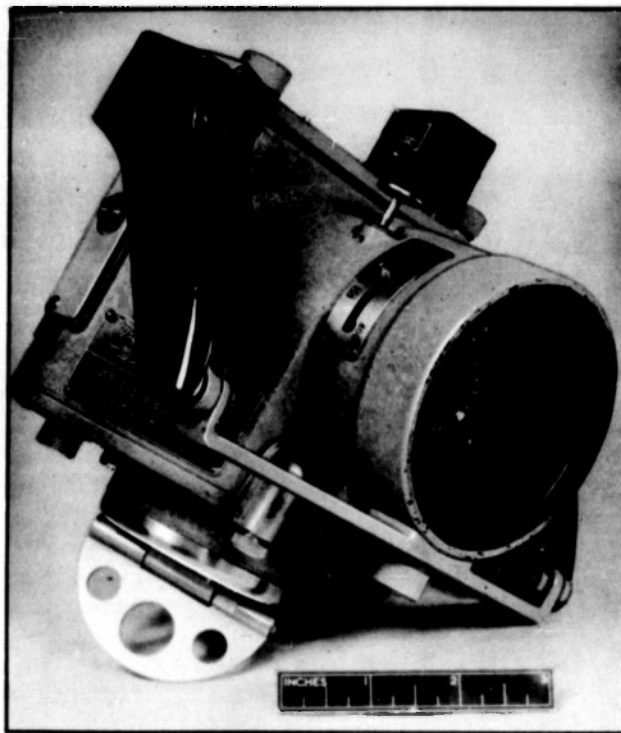


FIG. 2

G.S.K. 99 JAPANESE HAND HELD OBLIQUE CAMERA

BAE NEG NO 71516 46

FIG. 3



FIG. 3. S.K. 100 JAPANESE CAMERA

RAE NEG NO 71517 /46

14

FIG. 4 & 5

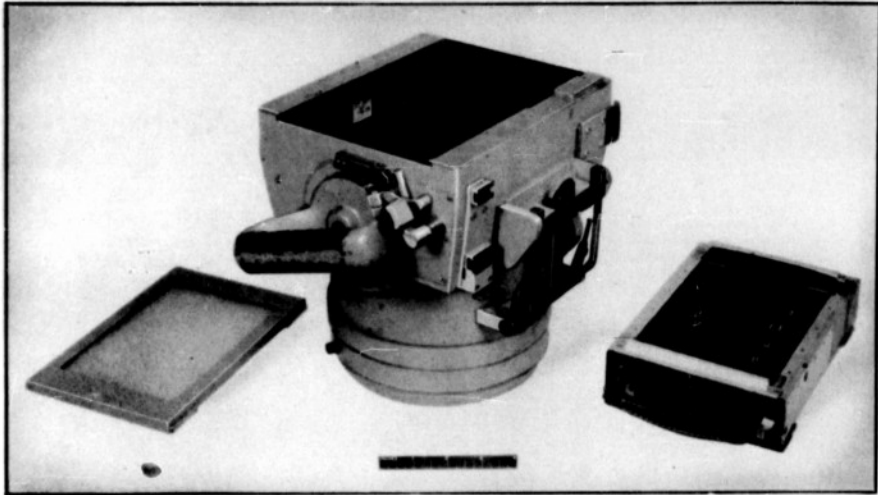


FIG. 4

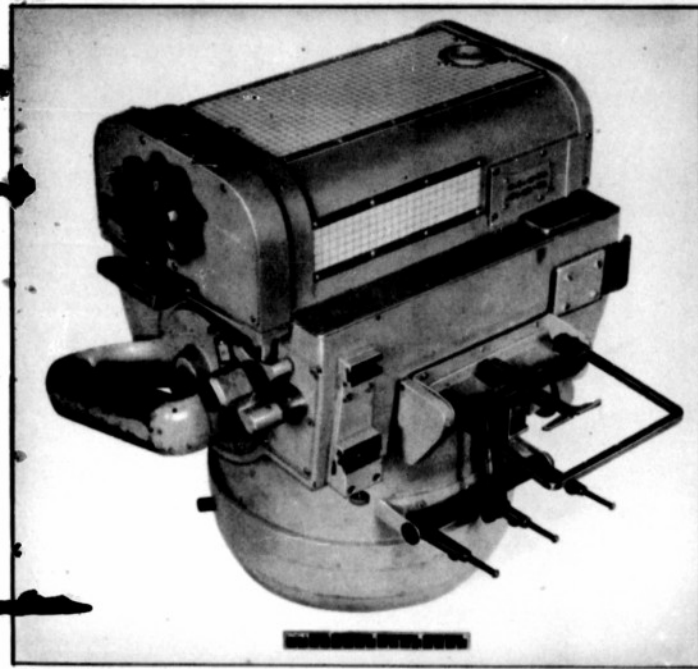


FIG. 5.

JAPANESE HAND HELD OBLIQUE CAMERA

8-11 NAC NO 71-51-13

15

RAE NEG NO 71519 / 44

16

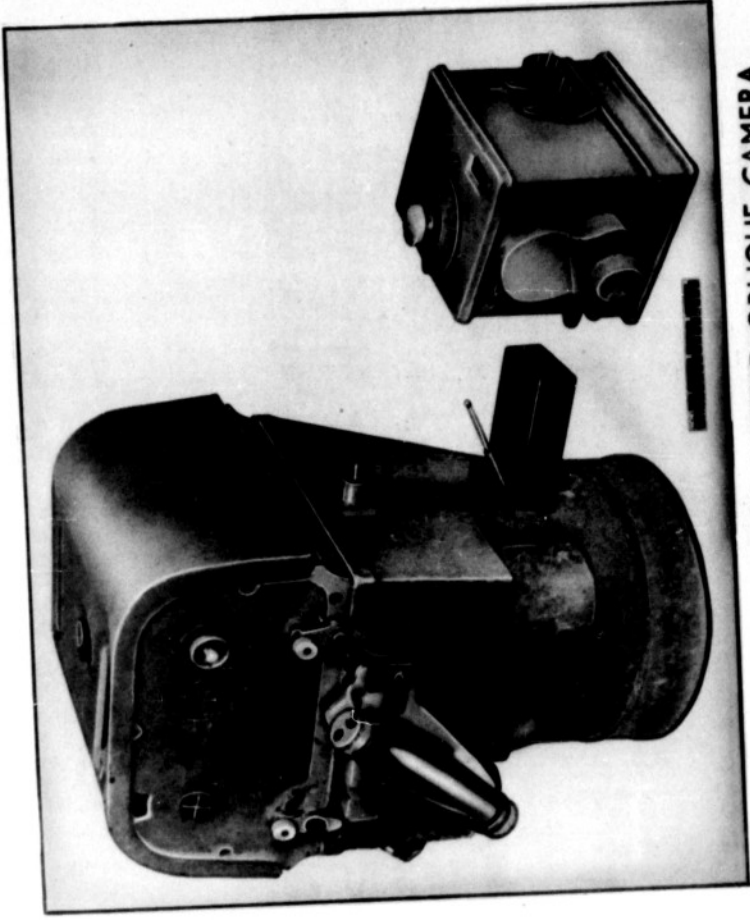


FIG. 6

FIG. 6. JAPANESE VERTICAL AND OBLIQUE CAMERA

RAE NEG NO 71520 (4)



FIG. 7

FIG. 7. JAPANESE AIRCRAFT CAMERA

7

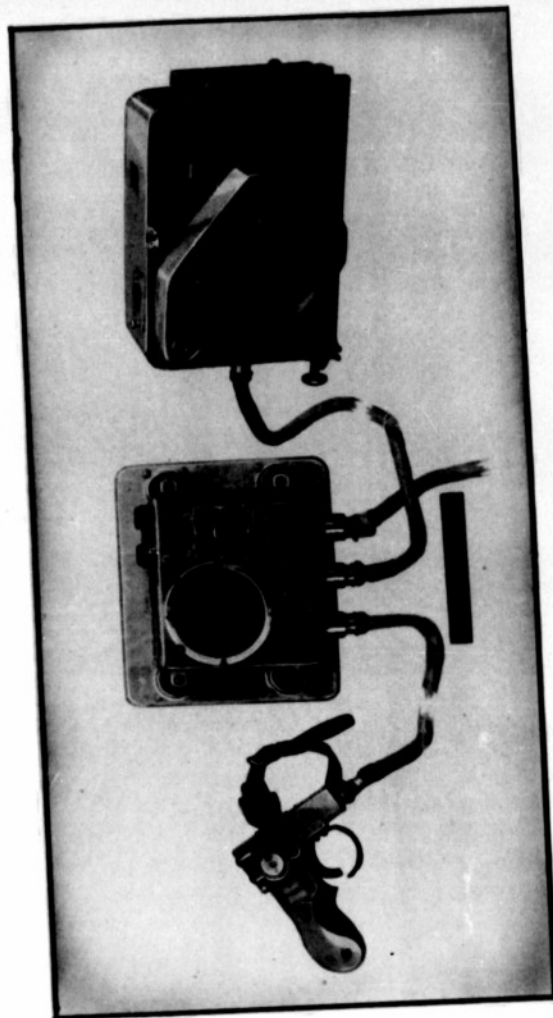


FIG. 8

FIG. 8. JAPANESE VERTICAL ROLL FILM CAMERA

RAE NEG NO 71521 /46

FIG. 9 & 10

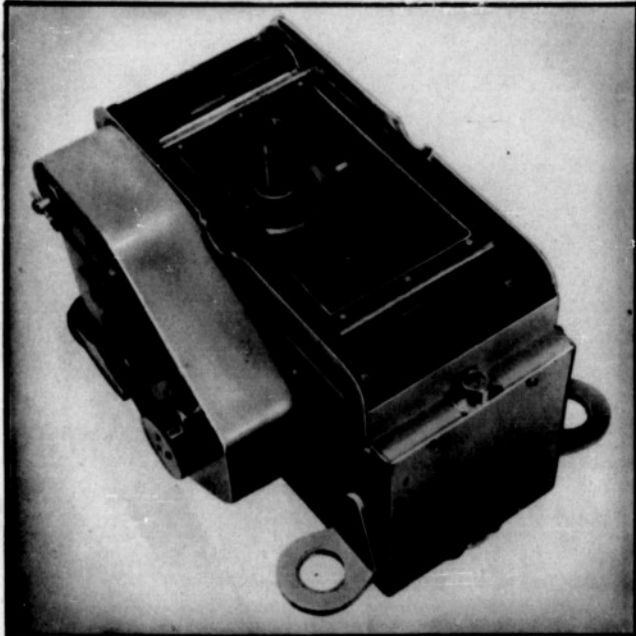


FIG. 9

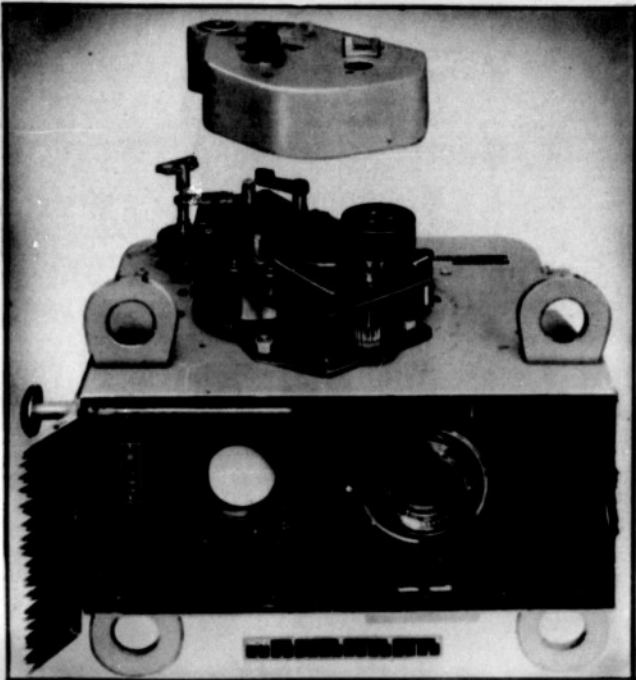


FIG. 10.

JAPANESE VERTICAL ROLL FILM CAMERA

BAI N.C. NO 71522 / 8

14

FIG. 11 & 12

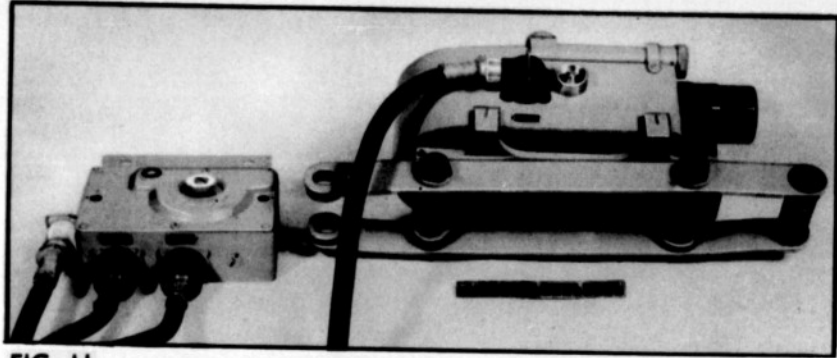


FIG. 11



FIG. 12
JAPANESE 35 mm. CINE GUN FIXED CAMERA

RAF NEG NO 71523 4

20

BAE NEG NO 71525 /46

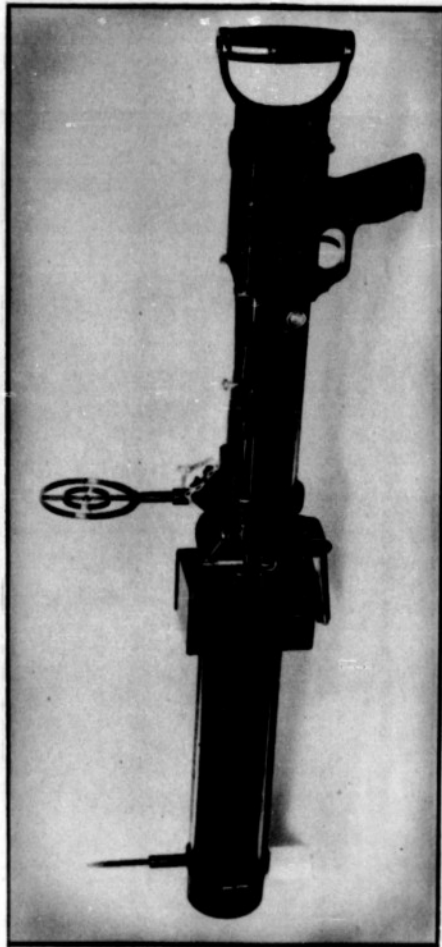


FIG. 14

FIG. 14. JAPANESE SINGLE EXPOSURE FREE GUN CAMERA

rc

FIG. 15



FIG. 15 JAPANESE SINGLE EXPOSURE FIXED GUN CAMERA

BAE NEG NO 71526 /46

23

REEL - C

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9 2 3 2

RESTRICTED

TITLE: Japanese Aircraft Cameras

ATI- 9232

AUTHOR(S) : Spencer, F.

REVISIONS

(None)

ORIG. AGENCY : Royal Aircraft Establishment, Farnborough, Hants

ORIG. AGENCY NO.

FA-278/3 PH-381

PUBLISHED BY : (Same)

PUBLISHING AGENCY NO.

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DATE	DOC. CLASS.	COUNTRY	LANGUAGE	PAGES	ILLUSTRATIONS
Sept '46	Restr.	Gr. Brit.	English	23	photos

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