Contents - Henry Larwig training spiral notebook

The SPIRAL

NOTE BOOK

No. 300

Made Under One or More of The Following
U. S. Patents [illegible]
and Other U. S. Patents Issued.

Inspections.

T.O. 01-20EF-2

T.O. 00-20A-2
Maintenance Instruction Forms.

A.A.F. 15-1, March 15, 1943
Flight Report, Forms 1 & 1A

T.O. 00-20A
Visual inspection of the airplane. Form 41B, 60A, 60B & 61.

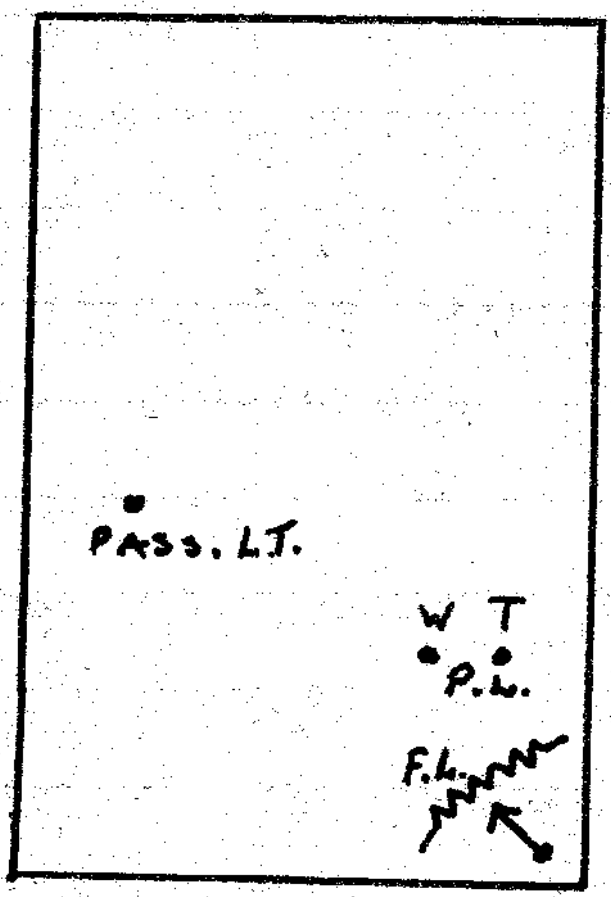
T.O. 00-1, Index
T.O. 00-5, Information

pre-flight
Daily
25 hour
50 hour

Engine Run-up

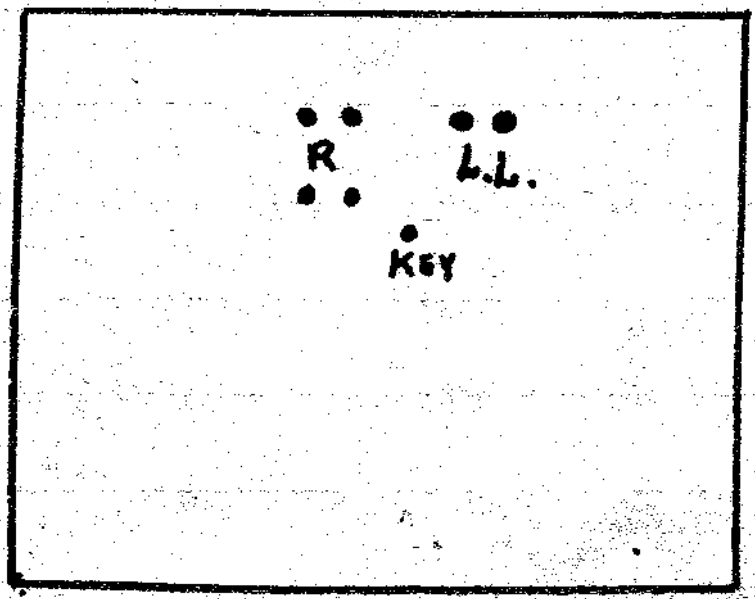
1. Check chocks and all clearances around plane.
2. Place fire Bottle. Unlock Flight control
3. Check switches + pull props through.
4. Set parking brakes. turn on hydraulic pressure.
5. Turn on Bat. Sw. + inverter.
6. open fuel shut-off valves + turn on boost pumps with mix control in Auto-Rich. check for flow in blower drain + move to idle cut-off.
7. Superchg. - no boost. props. - low. Pitch
8. open cowl flaps. next page.

light switches.



R- recognition
L.L. landing light
F.L. Form. light
P.L. position lts.

Pilots CONTROL PANEL.



CENTRAL CONTROL PANEL.

Intercooler in "cold position"
9. open throttle, ¼. Carb. air. "on"
10. Set prime pump.
11. Energize and mesh.
12. Cut in Mags and prime as neccessary
13. Mix Control in "auto rich"
14. adjust throttle. BE SURE to CHECK OIL PRESSURE IMEDIATELY. 70 to 80 #□" 75 #□ DESIRED, also check fuel pressure 14 to 16 #□" 15 #□" desired.
Lock primer
Check cyl. head. Temp (160°-205°)
Check oil temp. 60-80°.
Run to 1800 R.P.M. then check mags. Check prop pitch.

turn in generators at 1800 R.P.M.
Check mags for "off" at 800 R.P.M.
Check R.P.M at "Full Boost"
(46" @ 2500 R.P.M.).
Check vacuum to about 4" hg.
De Icer press. 8# P.S.I.
Chek inverter voltage (26-32 Volts).
Check idling 550 R.P.M.
For stopping pull mixture control
to idle cut off, then slowly
advance throttle.
Turn "off" all switches.
Jack controls.
(Then hope and pray everything
goes allright).

- Crew 35 -

18- LT. WALTER, H. KEILT - 677767
18- LT. RENE C. FIX - 0-682841
01- LT. HOWARD L. HARMSTON - 0679194
38- Sgt. HENRY J. LARWIG - 18132093
38- Sgt. JEFF. E. CRAM - 15116436
38- Sgt. WILLIAM, WIERSMA - 36205106
38- Sgt ALLEN, GEORGE J - 36202412
38 - Sgt. RUDGE, HARRY W - 33423244

2500 R.P.M. - 40" TAKE-OFF

2300 R.P.M. - 34" CLIMB

1950 R.P.M. - 29" CRUISE

Aircraft Recognition

U. S. Pursuits

P38	P51
P39	P70
P40	WILDCAT
P43	CORSAIR
P47	

BRITISH

SPIT FIRE
HURRICANE
BEAU FIGHTER

RUSSIAN

I-16
I-18
IL-2

German	W+F
FW190	34'-29'
Me 110	53'-40'
Me 109E	32'-29'
Me 109F	33'-30'

Japanese	W+F
SENTO	37'-25'
NAGOYA	40'-30'
NAKA 97	37'-24'

ITALIAN	W+F
MC 200	35'-27'
MC 202	35'-30'
RE 2000	37'-26'
RE 2001	36'-27'

600 yds. effective range of a hand held flex gun.
1000 yds. effective range of a spexay turret gun.

Planes with 37' wingspan or less; add 100 to get 3/4 of radius). With 38' wingspan or more add 150 to get 3/4 radius. Use correct sight.

Angle firing

Angle of 30° or less subtract 5'
" " 30°-60° subtract 10'
" " 60°-90° subtract 5'

Machine guns

M2 Caliber 50 Browning
belt fed, air cooled.
3 recoiling groups
1. bolt
2. Barell
3. barell extension.
gun operates on short recoil.
1. Chamber pressure - 52,000 P.S.I.
2. Muzzel velocity - 2,750 ft per sec.
3. Barell has 8 lands and 8
grooves turning to the right.
make 1 turn every 15"
4. recoil of barell and extention
is 1 1/8"

steps in firing

1. Recognize the aircraft
2. use wing span or fuselage
3. determine angle if any
4. determine part of sight filled + estimate range

5. recoil of bolt 7 1/8"
6. recoil of parts before unlocking 5/8"
7. fire control is your cocking lever. fire control is effective 3/8" of battery.

Battery position - when bolt is locked to your barrell extension and your barrell extension is against your trunion block.

fire control – is any part or parts that prevents premature release of the firing pin before the action is closed and locked.
Recoil – is the rearward movement of the recoiling parts.
Counter Recoil – is the forward movement of the recoiling parts.

Ballistics are the forces that act on the bullet after it leaves the gun.

Sperry Upper Local.

turret turns 0-360° azmuth
85° zenith.
Sperry K-3 computing sight
on upper turret.
turret opperated electric-hydraulic.
A thrust bearing supports
the entire weight of turret.
8 rings in collector ring assembly.
6 in use. 2 spares. in terminal box.
Push to talk switch located
by right foot.
8 fuses in turret, 4 used and
4 spares. In junction box on
upper left side. 170A-power
20A-firing circuit, 15A sight and

5A for trouble light.
1. sight switch
2. Main power switch
3. gun selector switches
4. safety switch
5. firing switch
800 rounds for turret, 400 rounds for each gun. 3 cans for each gun (125 rounds in each can).
(Centralizing springs).
turret weight 1,015 lbs
45° per second speed of azmath
30° per second elevation
40 3/4" diameter of turret
Terminal box provides a means of supplying electricity to the turret and for its communicati

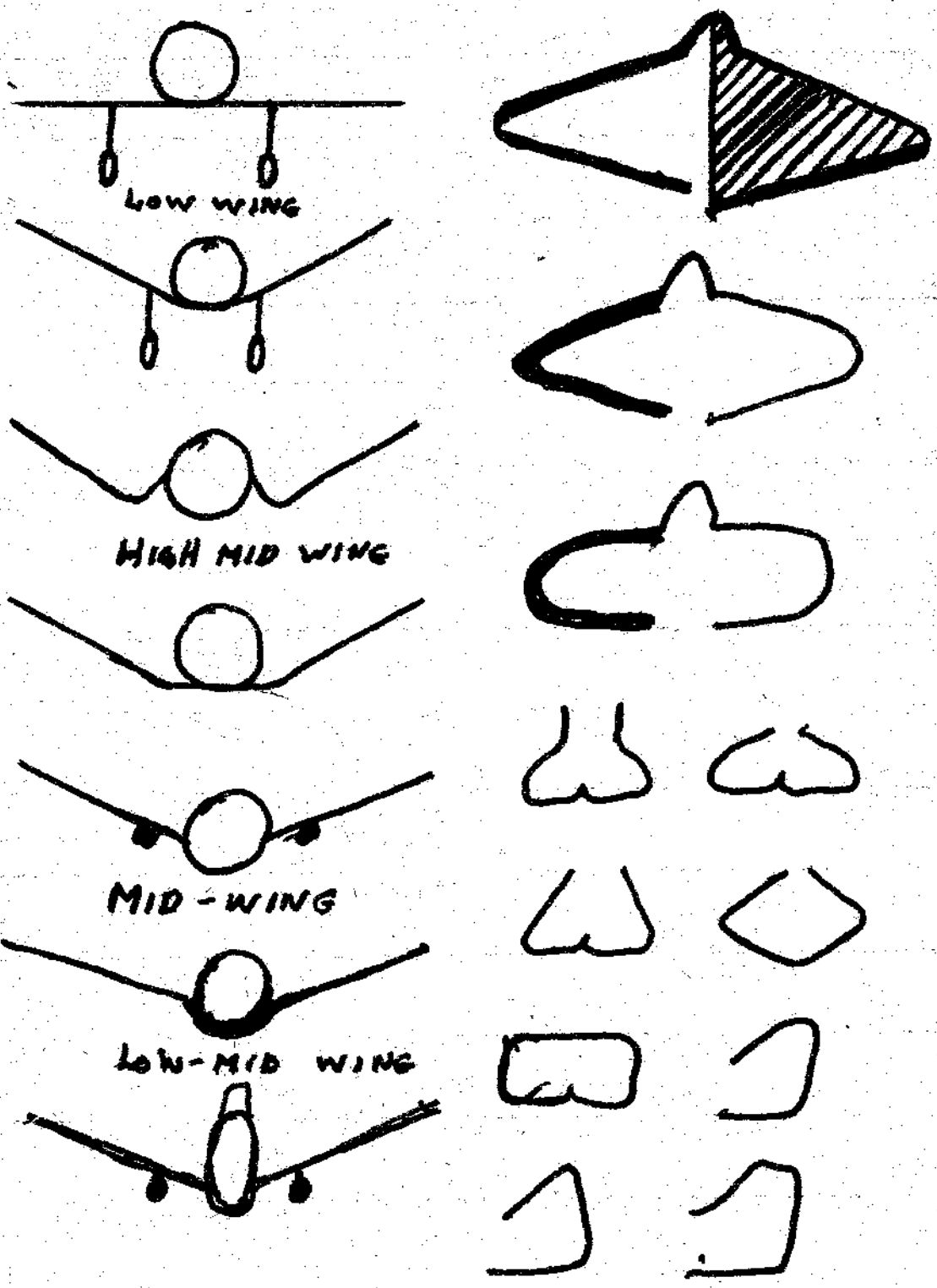
50 Cal. M2

Nomenclature of Groups

1. Back Plate
2. Cover
3. Oil Buffer
4. Barrell
5. Casing
6. Bolt.

5 forces effecting the bullet.

1. Air resistance
2. Mount Velocity
3. Bullet Rotation
4. Profellant charge
5. Gravity.


LOW WING
HIGH MID WING
MID-WING
LOW-MID WING

Nomenclature

I. Cover group.

1. Cover Extractor Cam.
2. Cover Extractor Spring
3. Belt feed lever
4. Belt feed lever plunger spring
5. Belt feed slide
6. Belt feed pawl
7. Belt feed pawl arm
8. Cover Latch and spring.

II Back Plate Group

1. latch and latch lock.
2. Buffer Plate
3. Buffer Disc.
4. Buffer Adjusting screw.

III. Bolt Group

1. Bolt stud
2. Driving Spring
3. Extractor assembly
   A. Ejector
   B. Lug
   C. Hook
4. Extractor stop pin
5. Bolt switch
6. Grooves
7. T-Slot
8. Recoil Plate
9. Firing Pin Port
10. Lower Projection
11. Middle Projection
12. Bolt Recess

13. Cocking lever Pin
14. Cocking lever
15. Sear stop
16. Sear side
17. Sear - sear notch + sear spring
18. Firing Pin assembly.
    A. Striker
    a Extension
    c. notch
    D. Spring

VI Oil Buffer Group.

1. Oil Buffer Body.
    A. oil Buffer Body lock spring
    B. Oil Buffer tube lock spring
    C. accelerator
    a. accelerator Pin
    C. Breach lock depressors

F. Guide keys
G. Shoulders
2. Oil Buffer Unit.

V. Barrel Group
1. Barrel, muzzle end, breech end chamber, rifling.
2. Barrel extension.
3. Barrel extension shank
4. Barrel locking spring
5. Breech lock
6. Breech lock pin
7. Inner Recess

VI. Receiver Group
1. Trunnion Block
2. Receiver
3. Top plate bracket

4. Breech lock cam
5. Extractor cam
6. Extractor switch
7. Trigger Bar
8. Feedway.
9. Belt holding pawl
10. Belt holding pawl spring
11. Belt holding pawl pin
12. Front cartridge stop
Rear cartridge stop
link stripper.
13. Front barrel bearing
14. Barrel Jacket
15. Front & rear mounts
16. Charging handle
17. slide
18. bracket
19. Cover detent

R.W. GUN - VERTICAL DEFLECTION

200 YDS.	400 YDS.	600 YDS.
2FT.	5 F.T.	10 FT.

BULLET TRAIL

200 YDS	400 YDS	600 YDS
5 MPH	15 MPH	20 MPH

L. W. GUN - VERTICAL DEFLECTION

200 YDS.	400 YDS	600 YDS
0 FT.	2 FT.	5 FT.

BULLET TRAIL ABOUT SAMES R. W. GUN.

FRONT GUN - VERTICAL DEFLECTION

200 YDS.	400 YDS.	600 YDS.
1 FT.	3 FT.	8 FT.

AT 45° - BULLET TRAIL

200 YDS.	400 YDS.	600 YDS.
0	5 M.P.H	10 M.P.H

Limit stop adjustment

1. Loosen the three retainer screws on vertical worm gear.
2. Place guns at zero elevation.
3. Rotate the vertical worm gear (the top towards the front of the turret) until the two dogs meet.
4. Tighten up the three screws.
5. Tighten junction nut and replace housing.

Fire cut-off adjustment

1. Remove fire-cut-off housing
2. Place turret at 0° azimuth, and 90° elevation.
3. Place setting fixture in

hole of profile cam.
4. Loosen three screws on profile cam and three screws on horizonal worm gear.
5. Place cam pin in hole of setting fixture
6. Tighten all screws and check cam pin height.
7. Move turret to one side on azimuth.
8. Turn main switch "on" and close safety switch.
9. Relay will close.
10. Rotate turret slowly back- relay should open when cam pin reaches junction of slope and flat top of setting fixture.

take out fixture setting.
11. Replace housing.

Elevation Creep adjustment

1. Remove fire cut-off and eccentric gear box housings.
2. Loosen friction nut in eccentric gear box.
3. Loosen screw on zero detent.
4. Grasp vertical worm gear, rotate it back and forth until a neutral spot is found.
5. Tighten on screw of zero detent being careful not to displace the rate shaft and that there is equal tension on projection of zero detent.

G-4A - G-11 solenoids
G-4A on top, G-11 on back.

Nomenclature and Part function of the oil Buffer Tube.

1. oil Buffer Piston rod shank engages with barrell extension shank.
2. spring guide
3. guide key - right hand side
4. oil buffer tube spring
5. Tube cap.
   A. cap plug.
   B. spring.
   C. ring.
   D. packing gland.
   E. relief valve. (12-15# □")

{ 40 to 50 thousands clearance between valve and head.

6. oil buffer piston rod.
7. A. shank
8. Head.
9. valve
   A two flat stock keys
10. oil buffer piston rod nut.
11. oil buffer tube
   A. 2 filler plugs
   B. Index slot
12. oil Buffer Piston rod head
   A. 6 throttling ports, helps form restricted openings.
13. Valve
   A. valve has oversized opening

AXS-777 oil used in oil buffer pistons.

3 flexible shafts
A. Azimuth
B. elevation
C. range
2 deflection dials
2 position dials
deflection dial thumb screws
optical head.
range dial
airplane dimension dial
lamp housing
lamps

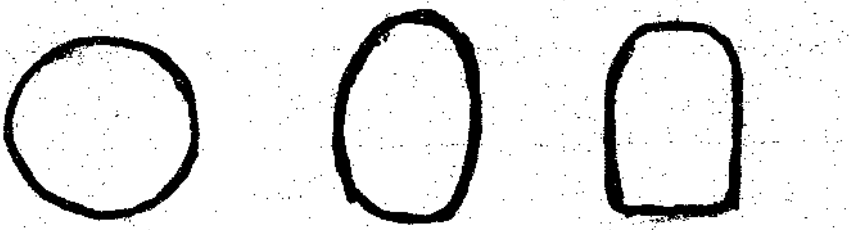
Use 3580 in hydraulic units.
Grease AN G3 or Beacon MR85

3 position stoppages.
1st. When action is in battery position, bolt stud forward.
2nd. When bolt is one half the way back to all way forward.
3rd. From half way back to all the way back.

Boresighting

1. Remove bolts and back plates.
2. Remove all flexible cables from sight.
3. Center left gun adjustments.
4. Boresight left gun on a target 1000 yds or more away.
5. Adjust right gun to boresight on the same target.
6. Turn target dimension to 20 and range dial to 1000 yds.
7. Remove lamp and lamp housing.
8. Turn deflection dials to read zero. (alternating adjusting with shafts in inputs) (Ag. + Eg.).

9. Place Reticle on same boresight target (By use of thumb screws).
10. Turn turret to 0° lg. and 0° elevation.
11. Replace lamp and lamp housing and turn sight "on".
12. Turn position dials to 0. (use same method as adjusting deflection dials).
13. Connect all flexible shafts, meshing with closest tooth.
14. Replace bolts and back plates.



1. square wing tips
2. round wing tips

Wing position

1. Low wing
2. Low mid wing
3. mid wing
4. high mid wing
5. High wing
6. Parasol wing

Wing types

1. dihedral.
2. Straight center section, outer dihedral
3 negative dihedral.

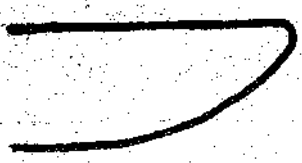
landing gears

1. fully retractable gear
2. semi-retractable gear
3. fixed landing gear

Engines

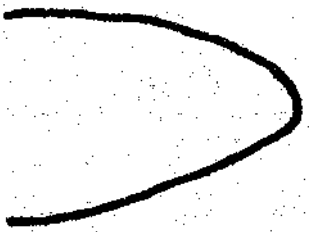
1. inline — No. of engines
2. radial

Air scoops - size and position



TAPERED

SWEPT BACK



SWEPT BACK
TAPERED

ELIPTICAL WING

ROUNED TRAILING
EDGE

2-11 solenoids

Henry Lowe Bell

1290# weight without gun and amunition
(It has no safety switch).
suit heater and trouble lamp
It has some armour plating.
It is the safest turett.
(675 in left gun and 500 in sight gun. (amunition)
turret moves 0-360° azimuth, elevation is from 0 to a minus 90°
0-45° per second in azimuth
0-30° per second in zenith
turret mounted to a trunion

which is on a eye beam
self aligning bearing
Centering column.
Azimuth ring gear is mounted
by twenty load shock absorbing
mounts.
everything for elevation is
on left. azimuth is on
right.
Elevation power rack moves
turret in elevation (segment
gear).
Elevation hand rack moves
turret in elevation by
hand. (on left hand end
bell).

hand control and limit stop unit
4 flexible shafts.
* { Fixed segment gear (elevation) Mounted on left hand trunnion support bracket
Fixed segment takes care of input to limit stops
takes care of elevation prediction to K. 4
left foot - range dial
right foot - push to talk sw.
5 clutches
1. elevation hand clutch
2. Exterior elev. power clutch
3. interior elev. power clutch
4. azimuth power clutch.
5. interior elevation hand. clutch

Caliber 30 Browning M2

Muzzel velocity 2800 ft per second
Chamber pressure 50,000 P.S.I.
Max. Range 3,500 yds.
Rate of fire 1000 to 1200 rounds
per minute.
Bolt recoil 4.4"
Barrell + Barrell ext. 5/8"
Recoil before unlocking 3/8"
Fire control effective up to 3/16"
from battery.
Firing pin released in ext.
fire 1/16" from battery.
barrel length 24"
4 lands, 4 groves, turn right
1 complete turn every 12"

gun weight 36#
Cover group same as 50 cal.
Back plate group has horizontal latch lock.
Bolt group.
single driving spring.
bolt stud collar offset, long end goes in bolt.
Extractor assembly.
Extractor cam plunger takes place of extractor lug.
Ejector ejects every round and must be changed when changing feed.
Sear holder and plunger and spring, push up to remove.

sear sems horizonal, sear
plunger and spring.
sear notch vertical.
Firing pin all one piece. two
firing pin notches.

Lock frame group. (take place
of oil buffer group).
accellerator and depressors
Trigger bar on top of lock
frame. spring in back.
Accellerator stop stud. sinew
left side.
Barrell plunger spring - sinew
left side (absorbs recoil of
barrel + barrell extension).
guide keys).

lock frame retained - right rear side.

Barrel group.
barrell lock spring - left side
barrell extension has 4 sized recesses.
same type breech lock (sliding wedge.
{ breech lock pin and oscillator pin are interchangable
T-lug. (Barrell extension shank).
barrell plunger stud - left side of T-lug.

Reciver group
Charging handle assembly

bracket and slide, and charging handle.
breech lock cam, bottom of receiver.
top plate bracket.
2 cartridge stops, one acts as link stripper.
extractor cam
extractor feed cam.

Barrell jacket
muzzle attachment, aids in recoil of barrell + barrel extension (300#).

Procedure in entering turret

1. Remove ① elevation hand crank from its clip and attach to shaft.
2. Move ② elevation hand clutch to "in" position
3. Move ③ elevation power clutch ④ to "out" position, using clutch handle, then replace handle in clip.
4. Loosen ⑤ elevation brake slowly, holding ⑥ elevation hand crank firmly.
5. Crank turret down to ⑦ -20°
6. While holding ⑧ elevation hand crank, open ⑨ turret door.

Reach inside and move (10) elev. power clutch to "in" position
7. Move (11) elev. hand clutch to "at" position, and remove (12) elev. hand crank and place in clips.
8. Enter turret, close (13) door securely (14) by handles all way up and (15) turret door is locked, before turning (16) right and main power switches on.

Chanel and roller arms give possible rate to lower turret.

3580 fluid + 1 N.F. 3 grease
A end yoke.
Units operated 800 to 900 P.S.I.

1. A END - Constant speed + variable displacement
2. B end - variable speed + constant displacement.
3. A end or hydraulic pump driven by constant speed motor (4000 RPM).
4. B end - hydraulic motor driven by A end.
5. Both azimuth + elev. rockers units are identical + interchangeable.

Replenishing pump maintains constant pressure of 85 P.S.I. Booster piston + cylinder - it moves or displaces the A end yoke.

relief valve. - relieves abnormal pressure (set at 1250 P.S.I.).

fluid flows through high pressure from A end to B end.

Ammunition for 30 + 50 calibers.

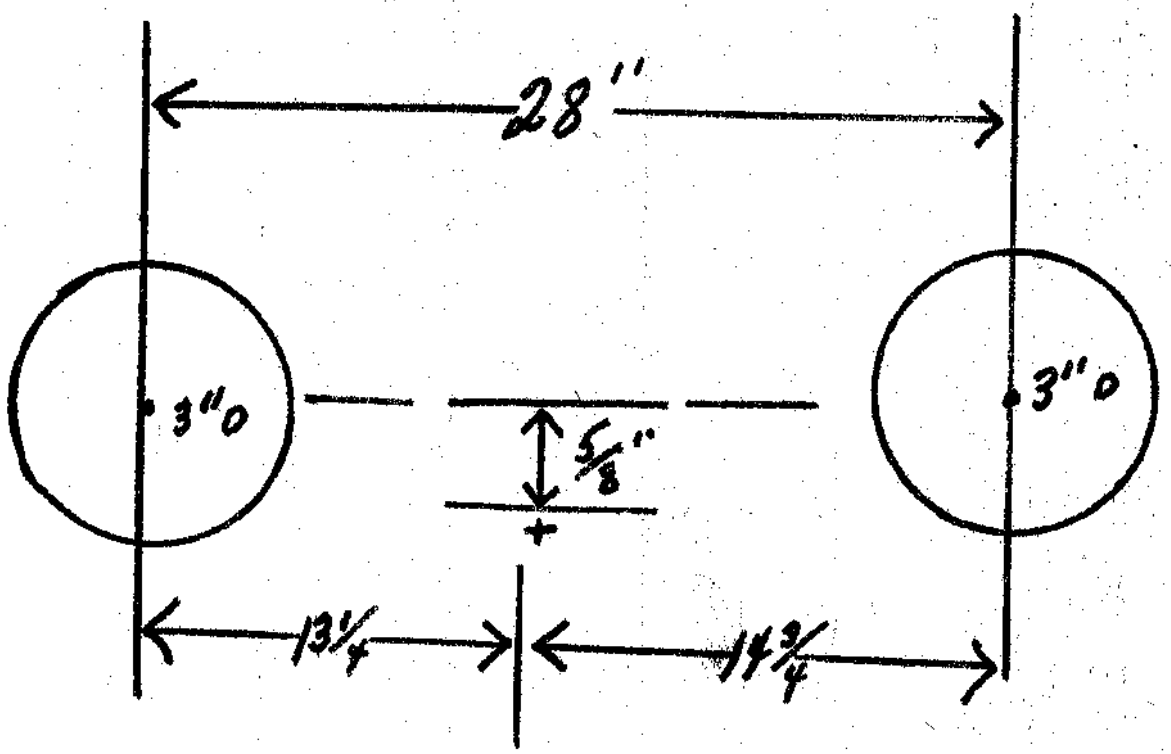
1. Ball type - used against personal and light vehicles or unprotected shelters (projectile is copper filled with lead). no marking on projectile.
2. Armor Piercing - used against armored vechiles, concrete shelters or any protect shelter of any kind. (copper jacket, with armor piercing projectile inside, lead in tip of copper jacket). tip from 1/16" is painted black.
3. Traces - used to tell the gunner the trajectory of his shells. (traces slightly longer

than normal shells). also use
for incindeary purposes. tip
to 1/16" painted red.
4. Incideraay - used to set fires).
tip painted light blue.

Belts usually loaded 4 to 1
4 armor piercing and 1 tracer).

100 round - 30 1/4 lbs.

divide by 10 to get size of disc in "



Boreright disc for lower ball

LEFT SIDE

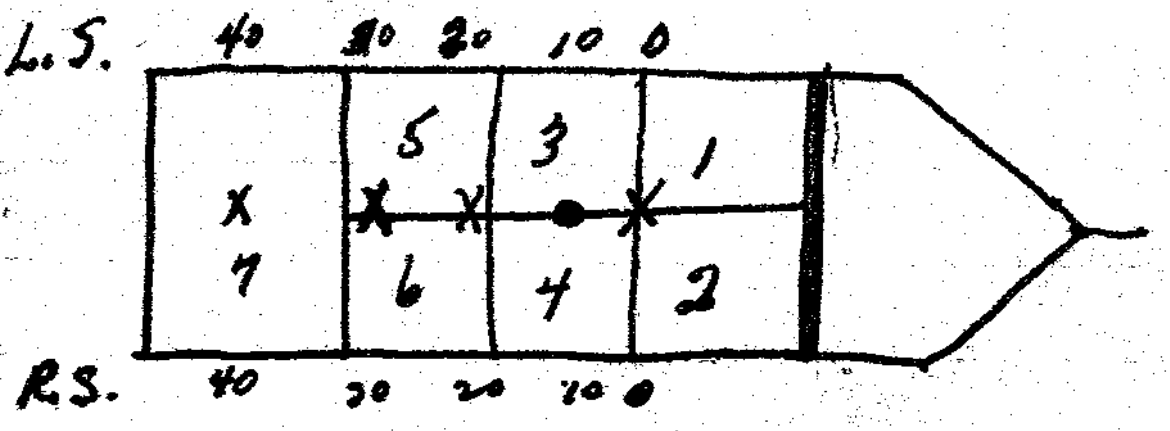
0-M.P.H. 2½' FT. LEAD

10-M.P.H. NO LEAD

20-M.P.H. 2½' BEHIND

30-M.P.H. 5' BEHIND.

40-M.P.H. 10 FT. BEHIND CENTER.



Aim along target top on right side

P-70
Beau fighter 2 Rad. engines
Beau fighter 2 Inline engines
P-38
Sento (zero)
M.C. 200 - Corg. cowl.
Gruman Wildcat
Spitfire
Hurricane
P-40
P-39
Nagoya (zero)
Naka 97 - FIXED. L.G.
Russian IL 2
Russian I-16
Russian I-18

M.E. 110
M.E. 109E
M.E. 109F
F.W. 190

Beaufighter (cabin + radial engines)
Hurricane

T.O. Read.

01-20EE1
02-3s-6G1
03-20EC1
03-10DA2
03-5-42
01-1-61 Pars 2 & in particular.