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Aviation

Co-Operation with Artillery

1916 - 1917

SECOND AUSTRALIAN DIVISION. *A 20/3*

HEADQUARTERS,  
2nd AUSTRALIAN  
DIVISION.  
*9/27/187*

Divisional Headquarters  
3rd November, 1916.

- ✓ C. R. A.
- 2nd Aust. Div. Sig. Coy.
- 5th Aust. Inf. Bde.
- 6th -do-
- 7th -do-
- 2nd Aust. Pioneer Bn.
- 

*6 Copies.*  
The attached Notes on Contact Patrols are forwarded for information in continuation of previous correspondence on this subject.

It is to be observed that wireless is only to be used by contact patrol machines in most exceptional circumstances.

*1 copy of attached notes to each*  
*94-5-6-22 Bids*  
*STMO. [Signature]*

Major,  
General Staff.



G.H.Q. O.B./1656.

Fourth Army No. G.S. 484.

639/230

# Instructions for Contact Patrol Work by Aeroplanes.

1.—Object. Contact patrol work by aeroplane is designed :—

(a) To keep Headquarters of formations informed as to the progress of their troops during an attack.

(b) To report on the positions of the enemy opposing the advance, the movement of his immediate reserves, and the state of his defences.

(c) To transmit messages from the troops engaged to the Headquarters of their formation.

Contact patrols supplement, but in no way take the place of, other systems of communication.

Observers must be fully informed as to the plan of attack, the disposition of the troops with whom they are working, and their objectives. Before going up, the observer should always, if possible, visit the Division or, if the operation is a small one, the Brigade concerned, in order to obtain all the detailed information possible. He should synchronise his watch with the Staff, so that he may know exactly when to look for the attack to commence. As much notice as possible should be given to the squadron concerned when a contact patrol is required, in order that the observer may have time to make these visits.

2.—Recognition of Aeroplane. Aeroplanes detailed for contact patrol work must have special markings, which should be known to all ranks of the infantry with which they are working. They will, in addition, carry a Klaxon horn and Very's lights for the purpose of making themselves known, and to answer signals received from the ground. Infantry may, as a general rule, expect to see their contact patrol machine vertically above our own and the enemy's trenches.

3.—Information sent to our Artillery. Aeroplanes on contact patrol must not be called upon to report regarding hostile batteries (but see para. 7), nor to check the fire of our artillery, which is the duty of the machines working with the artillery. From the position from which they work they are, however, very well placed to keep our artillery informed as to the movements of the enemy in immediate contact with our infantry (see para. 7).

4.—Methods of Communication between Infantry and Aeroplanes. Contact patrol aeroplanes receive signals from :—

- (A) Attacking infantry.
- (B) Battalion and Brigade Headquarters.

(A) Attacking infantry signal to the aeroplane by means of flares. Flares will be lit :—

- (i.) By previous arrangement
  - (a) at specified times;
  - (b) at specified places.

The former is, as a rule, the preferable plan.

The approximate hours at which flares will be lit should be laid down in orders. At these hours the infantry will be on the look out and will light their flares when their aeroplane calls for them by Klaxon horn (see para. 5). About half-an-hour after the objective is expected to be reached has been found a suitable time.

- (ii.) Without previous arrangement
  - (a) When called for by the aeroplane by Klaxon horn (see para. 5).
  - (b) On the initiative of local commanders, who may wish to make their position known.

Flares should only be lit by the order of local commanders when the aeroplane working with their formation is flying in their vicinity.

When flares are called for by the aeroplanes, it is important that they should be lit by the most advanced troops. Bodies of troops in rear will often light flares, thinking that they are the most advanced, but this will not prevent the location of the front line, provided flares are also lit there.

Flares can be seen if lit at the bottom of trenches or in shell holes, but care must be taken that there is no obstruction between the flare and the aeroplane. At least two flares per man should be carried by troops in the attack. The signal by Klaxon horn to call for flares will be a succession of "A's" (see para. 5). If the infantry cannot reply at once they should await a repetition of the signal before lighting their flares, otherwise they may be lit when the observer is not in a position to see them.

(B) 1. Battalion and Brigade Headquarters indicate their position and identity to the aeroplane by means of ground signal sheets and strips. Ground signal sheets (see Table 1.) are laid on the ground at the Headquarters concerned to indicate its position, while its identity is disclosed by the code letters of the Battalion or Brigade, made by ground signal strips, laid alongside the sheet, or sent on the panel or lamp (see 2 below) if strips are not available. Sheets and strips must be put out as soon as the Headquarters is established, and left out until it moves.

2. Battalion and Brigade Headquarters send messages to the aeroplanes by means of :—

- (a) Ground signal panel.
- (b) Lamp.

Ground signal strips will not be used for the purpose.

Complicated systems of communication are bound to break down in battle, and signals sent by the above means will therefore be confined to those given in Table 1.

Headquarters will indicate that they have a message for the aeroplane by displaying the white side of their ground signal panel, or by shining their lamp on the aeroplane. When the aeroplane is ready to receive a message it will send the code letters of the Headquarters concerned, followed by the letter "G" by Klaxon or lamp, using the Morse code.

Ca

Each word or code letter of a message from the ground will be answered by the aeroplane by the general answer "T," and the receipt of the message will be acknowledged by the code letters of the sender followed by "R.D." (see para. 5).

Ground signal sheets, strips or panels must be carefully sited in order to give the aeroplane observer a dark background if possible.

In signalling to an aeroplane from the ground, it is essential that:—

(i.) Signallers should know when the aeroplane is in a position to receive, and when it is not so.

(ii.) Signalling should be slow, and particular attention should be paid to timing and to the correct formation of letters.

(iii.) Signallers on the ground should have patience and continue sending until their signals are acknowledged.

5.—*Methods of communication between Aeroplane and Infantry.* Contact patrol aeroplanes communicate with the attacking infantry by means of Klaxon horns, using one signal only, namely, a succession of "A's," meaning "light flares." If the Klaxon fails to act, or if no reply is received, the aeroplane will fire a white light, indicating a call for flares. They communicate with Headquarters of Battalions and Brigades by means of:—

(a) Klaxon horns.

(b) Lamps.

using the morse code in both cases.

6.—*Methods of Communication between Aeroplanes and Headquarters of Corps and Divisions.* Aeroplanes communicate with Headquarters of Corps and Divisions by dropping message bags.

Observers should be provided with tracings on a suitable scale and showing all known trenches, on which the positions reached by our own troops will be marked as follows:—

Flares = .....

Battalion Headquarters =  with Battalion call letters.

Brigade Headquarters =  with Brigade call letters.

When necessary, the tracing should be supplemented by a message.

On reaching the ground the observer will report personally or by telephone to the Headquarters concerned.



7.—*Method of communication between contact patrol aeroplanes and the artillery.* Wireless will only be used by contact patrol aeroplanes for the purpose of sending down targets to our artillery. Such targets will be sent down under the zone call system as used by artillery machines. Contact patrol machines should watch especially for movements of immediate reserves, massing of troops for counter-attack, minenwerfers, machine guns and strong points holding up our advance, and targets of such nature. Hostile batteries will normally be dealt with by the artillery machines.

8.—*Special reconnaissances.* In addition to establishing communication between the infantry and Headquarters of formations, contact patrol aeroplanes may be employed to report on the enemy's dispositions and defences both before and during an attack.

Prior to an attack they are able to keep the Command constantly informed as to the progress and results of the artillery bombardment, while after an attack they can discover the enemy's fresh dispositions and sometimes his strength at various points. In this case also observers must be given all available information by the Staff concerned before starting.

Commanders and Staffs when giving orders for such reconnaissance must fully consider the risks run by pilots and observers in carrying them out. At an altitude of 1,500 feet or less an aeroplane is almost certain to be hit by rifle and machine gun fire from the ground, unless the enemy is fully occupied in fighting. Conditions will arise in which these dangers should and must be run, but it must be borne in mind that the loss of one or two good pilots or observers who know their ground impairs the value and efficiency of squadrons for a considerable time, and is only justified by the chance of obtaining information of really first-class importance. When giving orders the degree of importance attached by the Commander to the information required should be explained to observers, who will then be able to judge to some extent the risks which they are justified in incurring. A rough guide as to the height from which various objects can be observed in an average light is given in Table II.

TABLE I.—SIGNALS BETWEEN AEROPLANES AND INFANTRY.

1.—By the aeroplane ...	Succession of "A's" on Klaxon horn, followed by white Very light if necessary ...	Light flares
2.—By Battalion Headquarters ...	Semi-circular ground signal sheet with letters of Battalion call, e.g.,  AL ...	Battalion Headquarters.
By Brigade Headquarters ...	Three-quarters circle ground signal sheet with letters of Brigade call, e.g.,  PM	Brigade Headquarters.

8.—By Brigade or Battalion Headquarters:—

By lamp or signaling panel.	Meaning.	Answer by aeroplanes by lamp or Klaxon.	Meaning.
Bn. or Bde. call ...	Headquarters are here	T	Received.
Succession of B's ...	Enemy are retiring at	T	"
" F's ...	Enemy offering strong resistance	T	"
" G's ...	Further bombardment required	T	"
" H's ...	Lengthen range	T	"
" J's ...	Raise barrage	T	"
" K's ...	Lower barrage	T	"
" O's ...	Barrage wanted	T	"
" P's ...	Reinforcements wanted	T	"
" N's ...	Short of ammunition	T	"
" W's ...	Short of water	T	"
" Y's ...	Short of grenades	T	"
" X's ...	Held up by M.G. fire	T	"
" Z's ...	Held up by wire	T	"
O.K. ...	We are all right	T	"

Signals will be preceded by Battalion or Brigade call letter, if strips have not been put out. The map location of the point of the line to which reference is made will be given if necessary by the clock code, the position of the sender being considered as the centre of the clock face, and the hour 12 being always taken as pointing due North. The distance in yards from the point it is desired to describe will be given by a letter of the alphabet, "A" representing 50 yards; "B," 100 yards; "C," 200 yards; "D," 300 yards, and so on. The direction will be given by the hour on the imaginary clock face.

*E.g.*, if it were necessary to ask for the range to be lengthened at a point 400 yards N.W. of Battalion Headquarters, the message would be HHH E 10, HHH being acknowledged by T, and the whole message by the code letters of the sender followed by "R.D."

Distances of 150, 250 yards, etc, will be given by a two-letter signal, *e.g.*, BA=150, CA=250.

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TABLE II.

Heights from which various objects can be seen in a good light :—

*From 3,000 feet—*

- An attack can be followed.
- Bombing can be seen.
- State of trenches can be reported upon as to whether they have been badly damaged by bombardment or not.
- Trench mortar emplacements can sometimes be seen.
- Tracks can be seen.

*From 2,500 feet—*

- Men massed in trenches can be seen.
- It can sometimes be seen whether a trench is revetted or not.

*From 2,000 feet the following can be seen—*

- Wire in a good light (but not its condition).
- Overhead traverses.
- Sandbags.
- Comparative width of trench.

*From 1,500 feet—*

- Dug-out entrances.
- Comparative depth of trench.
- Men making signals, such as waving their helmets.

*From 1,000 feet or under* our own troops can be distinguished from those of the enemy.

24th December, 1916.

140/13

NOTICE ON CONTACT PATROLS.

The duties of Contact Patrol Observers are based on the information required for the moment by all formations in the Corps.

To gain information of the exact position of our troops, especially the front line, the existence of new trenches and obstacles, the progress of an attack, the assembly of hostile formations and the fire effect of both our own and the hostile artillery are among the more important duties which a Contact Patrol Observer has to carry out.

But to ensure success, it is not sufficient to have a well trained observer in the aeroplane. Perfect co-operation and understanding between the observer and the formation on the ground is ESSENTIAL.

If calls from the air are promptly responded to from the ground, then the task of the observer is simplified and lightened.

General Procedure of a Contact Patrol.

Prior to an operation the observer makes himself thoroughly acquainted with the situation as far as it is known, and the plan of the operations to be carried out.

It is essential that he sees the Corps and Divisional Orders and he is further assisted if he has a personal interview with the Staff who can explain in a few words with the aid of a map the more important information required of the observer.

The observer next acquaints himself by observation from the air, the position of our own various Headquarters.

He studies the ground over which the operation is to take place. He examines the hostile trenches and looks out for wire, strong points, or other obstacles which may impede a successful advance.

He notes the positions of successive positions of assembly and their objectives.

Zero hour onwards.

The observer at Zero hour is on the lookout for the advance to commence. If the light and the conditions of the ground are favourable, he can see the infantry go over the top and follow their movements.

If he cannot, or has any doubt, he calls on the front line infantry to show the observer their position.

The observer calls up either by firing a white Very's light or by sounding his "Klaxon".

The front line infantry respond by lighting two to three flares or flashing of mirrors. They mean "I am the leading Infantry and am within 50 yards of the actual firing line".

The display of flares or mirrors is to be carried out on definite lines, viz:-

- (a) On reaching the objective.
- (b) If held up before the objective is reached.
- (c) Or at certain predetermined hours after the attack as may be ordered, or when called upon by the observer.
- (d) At the end of the operations when it is necessary to clear up the situation.

As the object of flares or mirrors is for the observer to note exactly on his sketch map the positions of our infantry, it should be remembered that movement and light are the best means of attracting an observer's attention, therefore, if flares or mirrors are not to hand, the waving of arms, flags, and generally moving about in the trenches by day and striking and flashing torches at dusk will materially assist the observer in locating the infantry.

As each objective is reached or not as the case may be, the observer flies over the Corps and Divisional Headquarters and drops copies of his report with a sketch map attached in a message dropping bag.

Before dropping his message he calls up the Headquarters by sounding his "Klaxon", firing a Very's light or wireless.

#### Wireless Calls.

The observer sends information by wireless if the urgency of the situation warrants it, such as the assembling of hostile troops for a counter-attack, and the lengthening or shortening of barrages.

#### Brigades and Battalions.

Each Brigade and Battalion Headquarters as soon as halted should be in readiness to communicate with the observer by putting out its ground signals and laying out a panel.

The ground signaller calls up the aeroplane by his code call either on the lamp or panel.

The observer acknowledges by repeating the call and if correct the ground signaller sends "T".

Messages for transmission then follow, but it must be remembered that only the shortest of messages must be sent and whenever possible in code.

Note that the aeroplane observer has several units to watch and that the signaller on the ground require great patience and must go on sending their code calls until the observer answers.

Because a Battalion has no message to give the aeroplane observer it should not be a reason for not calling up the Contact Patrol aeroplane; on the contrary it assists the observer to know the position of Battalion headquarters and amongst other things it enables the observer to give early warnings such as an impending counter attack or drop a situation report with a photograph of the battalion's immediate surroundings.

The number of contact aeroplanes working at the same time on the Corps front, is dependent on the scale of the operation.

In the case of a broad front, two aeroplanes will be usually working.

One working on the front line and forward of the same, and the other clearing up the situation in rear of our own front line.

The latter's duty is also to keep battalions informed of the situation by dropping reports and also if possible a photograph showing their immediate front.

#### Appendix A.

N	N	=	Short of ammunition.
Y	Y	=	Short of grenades.
O	O	=	Barrage wanted.
H	H	=	Lift or lengthen range.
X	X	=	Held up by machine gun fire.
Z	Z	=	Held up by wire.
F	F	=	Our own infantry.
M	M	=	Flares or mirrors.

Above signals to be followed by map locations as required.

Appendix B.

Distinguishing mark on aeroplane.

As a distinguishing mark from other aeroplanes, the Contact Patrol machine has a broad black band under both lower planes and streamers are flown from the inner struts.

Aeroplane Equipment.

The observer has on the machine for the purpose of communication, Very's Lights, 'Klaxon' Horn, a Daylight Signalling Lamp, Wireless Sending set and Message Bags with which to drop messages.

Ground Equipment.

Corps Headquarters, Divisional Artillery and certain Field Artillery Brigades besides the majority of Heavy and Siege Batteries have wireless receiving stations.

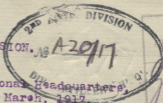
All Headquarters of formations, viz. Corps, Divisional, Infantry Brigades and Battalions have ground signals.

Brigade and Battalion Headquarters have Daylight Signalling Bamps and panels.

3-10-1916.

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Divisional Headquarters,  
19th March, 1915.GENERAL STAFF CIRCULAR MEMO. NO. 27.

1. The attention of units is drawn to G.H.Q. O.E/1686 "Instructions for Contact Patrol Work by Aeroplanes", issued under Fourth Army G.S. 434 and re-issued to units under this office G.37/230 of 17-1-17.

2. The following explanatory notes are added to illustrate the G.H.Q. pamphlet "Instructions for Contact Patrol Work by Aeroplanes" -

(a) With reference to para. 2 - "Recognition of aeroplanes" - until further notice, the "special markings" of all contact aeroplanes working with the 1st Anzac Corps will be a broad black streamer (2 ft. by 15 inches) from each wing.

(b) With reference to para. 4, sub-para. 2 (i) (on page 2) -

(i) When the aeroplane is directly over the signalling apparatus on the ground, the observer is not in a position to read signals:

(ii) The aeroplane observer is in the best position to read a signal message from the ground when his aeroplane is over any spot on the ground which is from 500 to 1000 yds. from the signalling apparatus.

(iii) To read a message from a signalling apparatus on the ground the aeroplane will endeavour to fly round the apparatus on a circle in the air, the plan of which on the ground would be a circle of 500 to 1000 yards' radius.

(c) With reference to Table I. (page 2) -

(1) The letters of the brigade and battalion calls to be used will be the letters of the code calls issued with the 1st Anzac Corps pamphlet "Code Names and Code Calls" forwarded under this office letter G15/94 of even date.

(ii) The A.D., Signals, 1st Anzac, is arranging to issue to each infantry unit of the division -

- ~~A. - The letters of their code calls in American cloth.  
B. - American cloth semi-circular or three quarter circle ground signal sheets  
C. - Signalling panels.~~

3. At the present juncture, special endeavour should be made to ensure that the instructions are thoroughly understood by all concerned.

L. J. Arthur Major  
for

Lieut.-Colonel,  
General Staff,  
2nd Aust. Div.

CRA

SECOND AUSTRALIAN DIVISION.

A20717

Divisional Headquarters,  
28th March, 1917.  
HEADQUARTERS,  
1917  
2ND  
AUSTRALIAN DIVISION.  
(GENERAL STAFF.)  
G37/306

- C. R. A.
- 5th Aust. Inf. Bde.
- 6th -do-
- 7th -do-
- 2nd Aust. Pioneer. Bn.
- 2nd Aust. Div. Sig. Coy.

With reference to 1st ANZAC G. 140/21 of 17th March forwarded under General Staff Circular Memo No. 27 of 19th March, 1917., re Signalling to Contact Aeroplanes, the stores mentioned in para 4 (c) (ii) ( para 2 c (ii) of General Staff Circular Memo No 27) will be demanded by units from D.A.D.O.S. 2nd Australian Division.

s/c  
G37

O.C. 2nd Aust. Divisional Signal Company and O.C. Units will report when equipment is complete.

*W. H. M. M. M.*  
for Lieut.-Colonel,  
General Staff,  
2nd Australian Division.

SECOND AUSTRALIAN DIVISIONAL ARTILLERY.

A20717

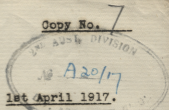
Headquarters,  
March 21st, 1917.

- 4 4th.A.P.A.Bde. (8th, 10th, 12th, 104th.Btys).
- 5 Advanced Guard Artly.(8th.P.A.B.H.Q., 11th, 14th, 15th, 105th.Btys)
- 1 18th.Aust.(Army) P.A.Bdes (for transmission to 15th.Battery)
- 1 2nd.Aust.D.A.G.
- 5 D.T.M.O.
- 1 file

The attached cop of 2nd.Aust.Div.G.S. Circular Memo No.27. of 19/3/17 forwarded for information.

*Cac*  
Capt-in,  
Brigade Major, 2nd.Aust.Div.Ar'illery.

ARTILLERY INSTRUCTIONS No.92  
by  
G.O.C.R.A. 1st ANZAC.



1st April 1917.

1. Attention is drawn to para.7 of G.H.Q. O.B./1656 dated 24-12-16, entitled "Instructions for Contact Patrol Work by Aeroplanes".
2. It is pointed out that our present resources in aircraft and the prevailing conditions of warfare render possible the full development of aeroplane observation for the Field Artillery and communication between them by wireless.

The situation is influenced by the following factors :-

- (i) One entire Squadron R.F.C. is affiliated to each Division in front line; therefore sufficient machines are available for continuous patrol, subject to conditions of weather.
  - (ii) The Field Artillery ground communication in open warfare cannot be expected to be so efficient and complete as in trench warfare, therefore every supplementary method must be exploited to its full extent.
  - (iii) The distance over which the enemy must approach in the open and the possibilities of massing and approaching under cover from view of the Artillery ground observers are such, that without aeroplane observation, the Field Artillery will frequently lose the opportunity of turning on to the counter attack at the full range of their guns.
3. To meet these conditions, the 3rd and 4th Squadrons R.F.C. have been instructed, subject to weather conditions, to maintain a contact aeroplane fitted with wireless on the Corps front from dawn to dusk.

(ii) G.O.'s C.Divisional Artilleries will ensure that all available wireless masts are mounted in the most suitable positions, and that steps are immediately taken to exploit this system of observation and communication to the full.

In this connection, personal liaison between Divisional Artillery Headquarters and the Squadron Commander concerned is essential.

4. Nothing in these instructions is to be taken as relieving the responsibility of all Commanders of pushing forward F.O.O's and making full use of all methods of ground communication.

*R. C. [Signature]*  
Captain R.A.  
Staff Officer R.A. 1st Anzac.

Issued as under :-

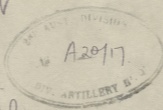
- |                  |                             |
|------------------|-----------------------------|
| <i>all units</i> |                             |
| Copies 1 to 5    | 1st Anzac.                  |
| 6                | 1st Aust.Divnl.Arty.        |
| 7                | 2nd Aust.Divnl.Arty.        |
| 8                | 4th Aust.Divnl.Arty.        |
| 9                | 5th Aust.Divnl.Arty.        |
| 10               | Heavy Artillery, 1st Anzac. |
| 11               | G.O.C.R.A. Fifth Army.      |
| 12               | 3rd Squadron R.F.C.         |
| 13               | 4th Squadron R.F.C.         |
| 14               | 13th Balloon Coy.           |
| 15               | 17th Balloon Coy.           |
| 16               | Diary.                      |
| 17               | File.                       |
| 18 )             |                             |
| 19 )             | Spare.                      |
| 20 )             |                             |

*[Handwritten initials]*

*[Handwritten initials]*

SECOND AUSTRALIAN DIVISIONAL ARTILLERY.

*Secret*



Headquarters,  
April 6th. 1917.

4th.A.F.A.Brigade.  
5th.A.F.A.Brigade.  
2nd.Aust. D.A.C.  
D.T.M.O.

*File*

The attached copy of Artillery Instructions No.92  
by G.O.C.R.A., 1st. ANZAC. is forwarded for information and  
guidance.

*OA*

Lieut.  
Acting Brigade-Major, 2nd. Aust. Div. Artly.

SECRET

5-DHA  
L400

93/3443  
24/7/18  
11.35 am

CLASSIFICATION  
SUB-SECTION  
85/3

COUNTER BATTERY.  
AUSTRALIAN CORPS H.A.  
No:- J 95.

1. The Instructions contained in the recently published amendments to 'Co-operation of Aircraft with Artillery' will be carried out forthwith.

Special attention is called to the following points:-

Page 31. AMF Calls - Each salvo is now fired on receipt of signal 'G'.

Page 29. Destructive Shoots - No observations will be sent down during fire for effect, except OK in the case of a direct hit.

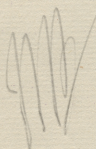
Page 60. Procedure for Balloon ranging - Methods A & B.

2. The following amendment will be made to COUNTER BATTERY INSTRUCTIONS No W 18.

S 13 - Conduct of shoots with aeroplane. (at end of sheet 4)

'Page 37, para 4' - The Battery Commander, after putting out 'V' will fire a salvo on receipt of the next 'G', and will then go to Battery fire, whether 'V' is acknowledged or not.

LY



*E. Cummins*

Lieut.Col.R.A.  
COUNTER BATTERY STAFF OFFICER.  
AUSTRALIAN CORPS HEAVY ARTY.

23/7/18.

Issued to all recipients of C.B.Instructions.

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**CO-OPERATION OF AEROPLANES WITH ARTILLERY.**

*(Reprint of a Memorandum prepared at and issued by General Headquarters,  
British Expeditionary Force.)*

I.—GENERAL CO-OPERATION.

1. The co-operation of aeroplanes with artillery may be divided broadly into two groups :—

- (a.) Moving battles.
- (b.) Battles of position.

In both of these, rapid and effective co-operation is difficult of attainment and requires careful arrangement and considerable practice. The closest touch should therefore at all times be maintained between the headquarters of artillery and the Royal Flying Corps unit concerned.

2. During a moving battle, both in attack and defence, the attention of field artillery brigades will be principally occupied in supporting the infantry in their immediate front, and aeroplanes can assist them by locating targets and giving the approximate range as quickly as possible by the method described in paragraphs 5 (b), 6 and 7. Situations will sometimes arise when it will be of great advantage if the observer is able to bring fire to bear immediately.

In battles of position, targets are often the same for several days, and consequently the difficulties are less and the methods employed can be of a more deliberate and methodical nature.

3. The duties of the aeroplane observer are to locate targets and to observe for range and fire effect. In moving battles, these duties of reconnaissance and observation must necessarily be carried out in rapid succession, and the observer should be able quickly to bring the fire of the artillery he is serving to bear on any suitable target.

In battles of position, on the other hand, reconnaissance and observation are entirely distinct. Targets are generally located the previous evening, and instructions issued by the staff of the artillery concerned. Though the position of targets may be altered during the night, if several targets have been selected this system of previous reconnaissance usually allows actual firing to start early.

4. As there are two broad phases in the co-operation of aeroplanes with artillery, so also there are two methods by which this co-operation is effected, viz :—

- (a.) The direct method.
- (b.) The deliberate method.

(a.) The procedure is for the observer, having selected the target, to fly immediately over it, and signal by means of lights, smoke or wireless. This provides the artillery with the necessary data to open fire immediately. The methods by which this is done are described in paragraph 5 (b).

(b.) The general method of procedure is as follows, and applies equally to the case when there is a landing ground near a battery, or when one central landing ground only is available :—

*Reconnaissance.*—Every morning and evening a special reconnaissance of the whole front for suitable targets should be carried out. A representative from the artillery

[A 1802]

staff concerned should be present at the landing ground to note the position of targets as found by the observer.

The observer carrying out this reconnaissance need not necessarily be the same observer who observes for fire.

*Observation of fire.*—The observer should receive instructions from the artillery headquarters every evening detailing the unit with which he is to work and the targets he is to engage the next day. The following morning he should proceed at once with the observation of fire. If the targets have disappeared during the night, or if for any other reason the observer wishes to communicate with the battery, he should either land near the battery or drop a message.

An alternative method is for the fire observer to make a detailed reconnaissance early in the morning, report the position of various targets to the artillery headquarters, and then receive instructions as to the one on which he is to observe. (This method, however, entails considerable loss of time, more especially if no suitable landing ground is situated close to artillery headquarters.)

The results of the day's work should be conveyed to the artillery headquarters every evening.

In the above methods the artillery headquarters can control the selection of targets on emergency by indicating to an observer any target required by means of sheets placed on the ground for communication purposes.

The direct method is best suited for moving battles; the deliberate method for battles of position; but in each case a combination of the two methods may be advisable.

5. The methods of locating targets and ranging are as follows:—

- (a.) In the ordinary course of aerial reconnaissance many possible targets are accurately located on the map. Any such target can be attacked by the method of ranging by bracket, the original range and direction being taken from the map, and the effect of fire observed from an aeroplane.
- (b.) A special target may be located by an aeroplane flying above the target and, when vertically over it, making a signal by means of lights, smoke, wireless, or other pre-arranged method. The direction and range are found as follows:—

The aeroplane in its flight is followed by the director, and at the moment the signal is given the direction is read off. This gives the line.

The methods by which the range is ascertained are either—

First.—By the angle of elevation of the aeroplane. By this method the aeroplane flies at a predetermined height. The angle of elevation is taken by clinometer, sextant or theodolite, and is read off at the moment when the aeroplane signals that it is vertically over the target. This gives two angles (one a right angle) and one side of a triangle, which can then be plotted and the horizontal range read off. Range tables can be made for different altitudes of the aeroplane. The higher the aeroplane the better the result, but the clouds sometimes limit the height at which the aeroplane is visible.

Second.—While flying at a predetermined height, the range of the aeroplane may be taken by range-finder when it is vertically over the target. This gives two sides of a right-angled triangle, which may be plotted as before, or,

Third.—The range and the angle of elevation of the aeroplane may be taken when at any height over the target. This gives one side and two angles of the triangle. The range may be taken either by range-finder or by two theodolites at the extremities of a measured base. The former is the quicker, the latter the more accurate, method.

The above methods may also be used in combination, and a mean of the results taken.

6. If it be desired to bring a heavy fire from a number of batteries on a single target, the methods described of ranging by means of an aeroplane vertically over the target are rapid and fairly accurate, and can be used against targets, the location of which cannot be accurately defined on the map. Personal errors may be introduced, but the results obtained by experiment have been satisfactory. When the simultaneous action of several batteries is required, the range so obtained, especially if lyddite from howitzers or heavy guns is being used, is generally near enough to give good results

without further ranging; the battery sections fire at slightly different elevations in order to distribute the fire in depth. If only one battery is to attack the target, the aeroplane may continue to direct the fire by signal.

7. Observation of fire can only be carried out for one battery at a time. The means employed are wireless telegraphy or signals by lights, smoke, &c. (For the method to be employed when using the signals by lights, smoke, &c., see code).

If it be desired to bring a concentration of fire on a fixed target, any number of batteries can be directed accurately from the air. In this case the ranges from the various battery positions should be found by any of the methods described in paragraph 5, and then ranging successively on the target under the observation of the aeroplane. When this separate ranging is completed, simultaneous fire can be opened.

## II.—OBSERVATION OF FIRE.

1. It has been found by experience that it is best to correct for line and range simultaneously.

As a rule single rounds are sufficient for observation, but it may sometimes be necessary to fire salvos of two or more guns.

Salvos may also be used when it is desired to carry out the observation of fire of one particular battery by aeroplane, and it is necessary to distinguish its line from that of several others firing at the same target.

Once the range and line have been found by the ranging section it may be necessary to correct the line of the remaining guns. This is best done by the battery carrying out battery fire (from the right) at a three seconds interval and the observer dropping a message showing where the rounds fell with reference to the target.

2. Very's lights and smoke balls, wireless signalling and lamps form the means of signalling from the aeroplane to the ground, and white strips of cloth, 6 feet by 1 foot, for communication from the ground to the aeroplane.

3. When possible, the aeroplane should remain close to its own guns at the best height for observation, in order to facilitate communication. It may sometimes, however, be advisable to fly out towards, or even over, the target to ensure accurate observation. In such cases much delay will ensue if the aeroplane has to come back over its own guns to signal the results; on the other hand, if it remains out in front the signals may not be seen.

4. If more than one target is to be engaged, it may sometimes be convenient to show the aeroplane which target is to be engaged by means of Roman figures on the ground.

Again, should the battery wish to engage a target not previously arranged for, this may be done by means of Roman figures on the ground, a code being mutually arranged to represent squares on the map.

When hostile aeroplanes appear it is advisable for the battery to remove any ground signals, and thus inform the observer that a hostile aeroplane is about.

5. The success of the ranging depends a great deal on careful preliminary arrangements, and these arrangements are often difficult to make before the aeroplane goes off owing to the strength and direction of the wind not being known.

Should it be necessary the observer can drop a message to the battery when work begins stating the system to be followed, *e.g.*, if the wind is blowing strongly from the target to the battery, and the range is a long one, he will have to fly between the battery and target in order to see, and with a propeller aeroplane (as opposed to the tractor type) must face the target to see the result of the rounds.

He should also be able to see the guns fire and so avoid the necessity of watching the target for an indefinite time. It is for the observer to decide how these conditions can best be complied with, and, having done so, to drop a message to the battery commander.

At the conclusion of ranging, should it be impossible to land near our battery, the observer should drop a message or rough sketch to the battery showing the general direction of the target with reference to the line of fire, and any other details which would be of assistance to the battery commander.

It is most important that two men should be detailed from a battery to watch the observing aeroplane, one with field glasses looking for the signals, the other with the naked eye keeping a continuous watch on it so as to make certain that no mistake is made as to the actual machine, since, when there are several aeroplanes out on observation, confusion between them is very likely to arise.



### III.—METHODS OF SIGNALLING FROM AND TO AEROPLANES.

1. The results of observation of artillery fire will be signalled from the aeroplane as follows:—

- (a.) When 3 separate signals are available.
- (b.) When 2 separate signals are available.
- (c.) By wireless signals or lamps.

(a.) By means of red and green lights and a smoke ball.

The code is as follows:—

Line.	Range.	Signal.
No correction.	Over.	Red.
No correction.	Short.	Green.
Left.	No correction.	1 smoke ball.
Right.	No correction.	2 smoke balls.
Right.	Over.	Red red.
Right.	Short.	Red green.
Left.	Over.	Green red.
Left.	Short.	Green green.
Correct.	Correct.	Red green red.

(b.) When two separate signals are available—

Line.	Range.	Signal.
No correction.	Over.	Red.
No correction.	Short.	Green.
Right.	Over.	Red red.
Right.	Short.	Red green.
Left.	Over.	Green red.
Left.	Short.	Green green.
Correct.	Correct.	Red green red.

An observer may wish to signal "No correction" for Line in either of the following cases:—

- (i.) When the shell falls so far short of the target that it is impossible to observe for Line.
- (ii.) When the Line is correct and the range wrong.

The following is an example (*see* rounds 1 and 5):—

Round.	Range.	Observed.	Signal.	B.C.'s orders.
1	3,200	Doubtful for Line. Short.	Green.	3,500
2	3,500	Right. Short.	Red green.	1 deg. more left. 3,800
3	3,800	Right. Over.	Red red.	1 deg. " left. 3,600
4	3,600	Left. Short.	Green green.	30 min. " right. 3,700
5	3,700	Line. Over.	Red.	3,650
6	3,650	Correct.	Red green red.	

Again, in this method, there is no signal for Line Left or Right, Range Correct. In practice it will be difficult for an observer to judge with accuracy that a shell falling right or left can be correct for range. In such a case the observer must proceed as if the range and line were wrong, using two lights until the line is correct, after which he proceeds with single lights for range until he can signal "Correct for Line" and "Correct for Range."

The following is an example (see rounds 6 and 7) :—

Round.	Range.	Observed.	Signal.	B.C.'s orders.
1	3,500	Too far to observe for Line. V. Short.	Green.	3,800
2	3,800	Left. Short.	Green green.	2 deg. more Right. 4,100
3	4,100	Right. Over.	Red red.	1 deg. " Left. 3,900
4	3,300	Right. Short.	Red green.	1 deg. " Left. 4,000
5	4,000	Left. Over.	Green red.	30 min. " Right. 3,950
6	3,350	Left. Correct.	Green red.	15 min. " Right. 3,925
7	3,925	Right. Correct.	Red green.	10 min. " Left. 3,950
8	3,950	Correct. Correct.	Red green red.	

In the event of the supply of lights running short a complete circle to the right may be substituted for a red light, and a complete circle to the left for a green one. Thus : two circles Right equals Red Red equals Right and Over.

NOTE.—If it is required, in either of the above cases, to range for fuze the signal Z will be put down by the battery. In this case the observer fires the following signals :—

- (1.) Green light for bursts on graze ;
- (2.) Red light for bursts in the air.

The height of bursts in the air cannot be judged by the observer.

(c.) The following code will be employed when sending messages from aeroplanes by wireless or lamps :—

Message.	Code (Morse).
Are you receiving my signals ? ... ..	B.
Stand by ... ..	A.
Fire .. ... ..	G.
Over ... ..	O.
Short ... ..	S.
Right ... ..	R.
Left ... ..	Q.
Air ... ..	A.R.
Graze ... ..	G.Z.
Just (as in "just over") ... ..	J.
Far (as in "far over") ... ..	F.
Mostly (as in "mostly graze") ... ..	M.
Some (as in "some graze") ... ..	S.
Line correct ... ..	Q.K.
Range correct ... ..	R.K.
Hit ... ..	O.K.
Shot unobserved ... ..	W.
Wait or stop firing ... ..	M.Q.
Battery in position at ... ..	N.
Battery firing in position at ... ..	N.F.
Change to ... ..	X.
Lengthen ... ..	LN.
Shorten ... ..	SN.
Degrees more right... ..	D.R.
Degrees more left ... ..	D.Q.
Wash out (as in "wash out target 3 of programme") ... ..	W.W.
Am returning to landing ground ... ..	C.B.

2. Figures of eight flown by the aeroplane over the battery signifies that the target being ranged upon is firing or is on the move.

Three red lights mean that the observer considers it necessary to stop the fire owing to the possibility of danger to our own troops.

3. The "Stop" signal followed by figures of eight means that the observer has discovered a fleeting target of superior tactical importance. The aeroplane will then proceed vertically over the target and will fire a smoke ball at 6,000 feet. This gives the necessary data for opening fire. As this procedure may lead to misapplication of fire, it will only be adopted by observers when a general authority has been received from artillery headquarters.

4. Strips of white cloth, 6 feet by 1 foot, placed on the ground can be used for signalling from the ground to aeroplanes.

The code of signals employed is as follows:—

From the aeroplane—

Signal.	Meaning.		
	Line.	Range.	Fuze.
One red.	No correction.	and over.	or *air.
Red red.	Right.	and over.	
One green.	No correction.	and short.	or *graze.
Green green.	Left.	and short.	
Red green.	Right.	and short.	
Green red.	Left.	and over.	
Smoke ball.	Left.	and no correction.	
2 smoke balls.	Right.	and no correction.	
Red red red.	Stop firing.		
Circle right.	†Same signal as red.		
Circle left.	†Same signal as green.		
Figures of eight.	Target firing or moving.		

\* Only when observing for fuze.

† Only used when lights are scarce and Battery Commander previously notified.

A green light fired before ranging has commenced, or after the stop signal has been made, signifies that the observer is ready to observe.

From the Battery—

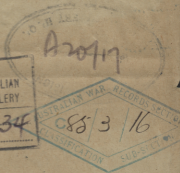
- L Ready to engage target.
- Z Observe for fuze.
- V Observe for fire effect.
- F Fresh target followed by number of target in Roman figures followed by L (ready to engage target).

Contact

2nd Div Art  
L159

Panel H.Q.

H.Q.
2ND AUSTRALIAN DIVL ARTILLERY
No. A20/34
Date.....



4th.A.F.A.Brigade  
 5th.A.F.A.Brigade  
 2nd.Aust.D.A.C.  
 2nd.Aust.D.T.M.C.

55  
15

H.Q.
2ND AUSTRALIAN DIVL ARTILLERY
No. A20/34
Date.....

Headquarters,  
 Aug. 9th. 1917

The attached copies of 2nd.Aust.Div.G.S.Circular Memo are forwarded for information. G.S.CIRCULAR MEMO 27 was forwarded to you under this office A 80/17 of 21st March 1917.

Delete sub-para. 2 (c) (ii) and insert the following -

2. (c) (ii) Each infantry unit of infantry divisions, and each unit of the mounted troops, will indent on Ordnance for <sup>Requisition</sup> lead and Capt. for Brigade-Major, 2nd.Aust.Div.Artly.

It is to be noted that ground signal code letters will not be issued in future; in ground signal strips will be issued instead, with which each unit will form the code letters which are allotted to it temporarily and which are liable to be altered periodically.

Handwritten initials

Ambridge

Lieut.-Colonel,  
 General Staff,  
 2nd Aust. Div.

DISTRIBUTION:-

- C. R. A. (17)
- C. R. E.
- 5th Aust. Inf. Bde.
- 6th -do-
- 7th -do-
- 2nd Aust. Pioneer Bn.
- 2nd Aust.Div.Sig.Co.

SECOND AUSTRALIAN DIVISIONAL ARTILLERY.

4th. A.F.A. Brigade  
5th. A.F.A. Brigade  
2nd. Aust. D.A.G.  
2nd. Aust. D.T.M.O.

5515

H.Q.
2ND AUSTRALIAN DIVL. ARTILLERY
A 20/34
No. ....
Date .....

Headquarters,  
Aug. 9th. 1917

The attached copies of 2nd. Aust. Div. G.S. Circular Memo are forwarded for information. G.S. CIRCULAR MEMO 27 was forwarded to you under this office A 20/17 of 21st March 1917.

Delete sub-para. 2 (c) (ii) and insert the following -

2. (c)(ii) Each infantry unit of an infantry division, and each unit of the 1st Cavalry Division, will indent on Ordnance for the following:-  
1. Capt. *McRobbie*  
for Brigade-Major, 2nd. Aust. Div. Artly.

As to 25 noted that ground signal code letters will not be issued in future; in ground signal code will be issued instead, with which each unit will form the code letters which are required to it temporarily and which are liable to be altered periodically.

*ML*

*Ambridge*

Lieut.-Colonel,  
General Staff,  
2nd Aust. Div.

DISTRIBUTION:-

- C. R. A. (17)
- C. R. E.
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- 2nd Aust. Div. Sig. Co.

SECOND AUSTRALIAN DIVISION

H.Q. 2ND AUSTRALIAN DIVL. ARTILLERY
DIVISION
No. <u>A 20/34</u>
Date

HEADQUARTERS  
2ND  
AUSTRALIAN DIVISION  
(GENERAL STAFF)

G37/382

Divisional Headquarters,  
8th August, 1917.

GENERAL STAFF CIRCULAR MEMORANDUM NO. 35.

G.S. Circular No. 27 dated 19th March 1917, will be amended as follows :-

Delete sub-para. 2 (c) (ii) and insert the following -

2. (c)(ii) Each infantry unit of infantry divisions, and each unit of the corps mounted troops, will indent on Ordnance for the authorised signalling equipment as laid down in G.R.O 2251.

Note:-

It is to be noted that ground signal code letters will not be issued in future; 12 ground signal strips will be issued instead, with which each unit will form the code letters which are allotted to it temporarily and which are liable to be altered periodically.

*W. L. ...*  
*W. L. ...*  
Lieut.-Colonel,  
General Staff,  
2nd Aust. Div.

DISTRIBUTION:-

✓ C. R. A. (17)  
C. R. E.  
5th Aust. Inf. Bde.  
6th -do-  
7th -do-  
2nd Aust. Pioneer Bn.  
2nd Aust. Div. Sig. Co.

SECRET.

First Army.  
Second Army.  
Third Army  
Fourth Army.  
Reserve Army.

1. The following additions are made to O.B./1656 of May 26th  
"Instructions regarding liaison between Infantry and Aircraft:-

At end of first paragraph of 3 (B), for last sentence  
substitute: "Messages received from the ground will be answered  
by aeroplanes by a Klaxon horn or lamp, using Morse code in each  
case.

Each word of a message will be answered by the general  
answer (T).

The end of the message will be acknowledged by the code  
letters of the unit sending from the ground, followed by R.D."

Appendix A (ii) ; "The code letters of the Battalion or  
Brigade putting out a ground signal may be made by strips along  
side the ground signal, as an alternative to being sent on the  
signal panel. No other messages will be sent by means of strips."

2. The value of contact patrol work between aeroplanes and  
infantry, and the necessity of lighting flares, when the contact  
aeroplane sends a signal asking for them to be lit, should be  
impressed on all units. If flares are not lit, the aeroplane has to  
fly much lower to try and distinguish between British and German  
uniforms, and this adds greatly to the risk of losing machines.

General Hd.Qrs.  
3rd October, 1916

(Sgd) H. Burnett Stuart. R.G.  
for Lieutenant General.  
C.G.S.

(Copy)

1st Army.  
2nd Army.  
3rd Army.  
4th Army.  
Reserve Army.  
-----

O.B./1656.

Secret.

In continuation of O.B./1656 of Octr. 3rd.

The following additional amendments are made to  
O.B./1656 of May 26th - "Instructions regarding Liaison between  
Infantry and Aircraft" :-

1. Reference para. 4, wireless will not be used by Contact  
Patrol Machines."

Para. (c) of Appendix A is cancelled.

These amendments are rendered necessary because it is  
considered dangerous to send information concerning our own  
troops by wireless, and in practice it has not been used for this  
purpose, also if contact patrol machines use wireless they are  
apt to jam the artillery machines, being from the nature of  
their work nearer the receiving Station.

2. Reference O.B./1656 of May 26th and Octr.3rd, the following  
nomenclature regarding ground signals by sheets, signalling panels  
and strips, will be adopted in future to avoid confusion.-

Ground Signal Panel.- A large Louvre Shutter which can  
be actuated to give Morse signals to an aeroplane. (This is describ-  
-ed in Appendix B to O.B./1656 of May 26th and was then termed  
"Ground Signalling Sheet")

Ground Signal Sheet.- A sheet laid on the ground indicating  
by its shape the position of Battalion or Brigade Headquarters  
(Appendix A 2(1) of O.B./1656 of May 26th.)

Ground Signal Strips.- Used alongside a ground signal  
sheet to indicate the code letter of the Battalion or Brigade  
putting the ground signal sheet (last sub-para of (1) in O.B.  
1656 of Octr.3rd)

General Headquarters.  
12th Octr. 1916.

(Sgd) J. BENNETT STUART

for Lieut-General.  
C.G.S.

B.G.

Copies to  
G.S.O. (a)  
R.F.C.  
A.A.  
D.A.S.  
G S. "I".



622

SUMMARY OF ARTILLERY DIRECTIONS.

III WING. R. F. C.

----- \*\*\* -----

1. Organization of R.F.C. in the Field.
2. Artillery Co-operation.
3. Photography.
4. Contact Patrol.

Vide -

- (1) S.S. 124.

Notes for Artillery Officers on Shoots with Aeroplane Observation, August 1918.

- (2) S.S. 131.

Co-operation of Aircraft with Artillery.

- (3) G.O.C., R.A. Fourth Army's letter re Wireless.

I - ORGANIZATION.

The R.F.C. in the Field is organized in Brigades, one Brigade being attached to each Army.

Three Wings form a Brigade. They are :

1. Army Wing. } Aeroplanes.
2. Corps Wing. }
3. Balloon Wing. Balloons.

The duties of the Army Wing are :

- (a) To drive the hostile machines from the air.
- (b) To protect our own machines engaged in other work.
- (c) Photography.
- (d) Reconnaissance.
- (e) Bombing Raids.

The duties of the Corps Wing are :

- (a) Artillery Co-operation.
- (b) Photography.

/(c)

(c) Reconnaissances.

(d) Contact Patrols.

The duties of the Balloon Wing are :

(a) Artillery Observation.

(b) General Observation of the hostile territory.

AN ARMY WING consists of 3 or 4 Squadrons of 16 machines each.

A Squadron consists of 3 Flights of 6 machines each.

The types of machines used are :

(a) Single-Seater Scouts, purely for fighting.

(b) Double-Seater machines for fighting, reconnaissance and photographic work.

A CORPS WING consists of as many Squadrons as there are Corps in the line, i.e. 3 or 4, one Squadron works for each Corps in the line.

A Squadron is formed of 18 machines divided into Flights as follows :-

(a) Two Counter-battery Flights of 5 machines and one Photographic machine each.

(b) One Trench Flight of 6 machines for Trench registration, Photography, Reconnaissance and Contact Patrol work.

All three Flights are responsible for close reconnaissance of the Corps area, and for the collection of any information required.

A BALLOON WING consists of companies, one Company being attached to each Corps.

A Company is divided into two Sections of one Balloon each. One Balloon is employed in Counter-battery work. The other Balloon carries out Trench registrations and the remainder of the work.

#### LIMITATIONS OF AEROPLANE AND BALLOONS.

An aeroplane can remain in the air for three hours at

at a time without replenishing petrol.

The maximum number of machines that can work with wireless is about 2 per mile of front.

A Flying Squadron cannot keep up an average of more than 55 hours flying-time a day, without its efficiency being impaired.

An aeroplane can locate a target, and range on it, with more accuracy than a balloon, as it can fly vertically above the target.

High wind and low clouds may make observation impossible.

#### WIRELESS STATIONS.

WIRELESS OPERATORS. are permanently allotted to units on the following scale :-

	<u>Operators.</u>	<u>Stations.</u>
At Corps H.Q. ...	2	1
At Counter-battery H.Q. (Central Wireless Station)	2	1
At each Heavy or Siege Bty. ...	3 to every 2 Stations.	1
At each Divisional Artillery H.Q. ...	2	1
Each Divisional Artillery Brigade.	2	1

These Stations and Operators move with the units to which they are allotted, but are attached to the Corps Squadron with which their unit is working at the time.

The Artillery Headquarters and units to which the Stations are attached make their own arrangements for the carriage of their instruments and operators.

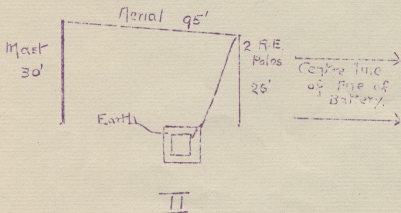
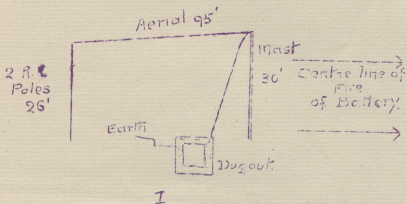
Four Spring carts are issued to each Corps for the transport of wireless equipment. These carts move with Corps and Divisional Headquarters, and will be used during an advance to convey reserve personnel and equipment to forward stations to replace casualties.

(There

Where a battery has only one operator, he should be relieved when necessary by a telephonist from the battery.

Correction.

In S.S. 124 "Notes for Artillery Officers with Aeroplane Observation" and S.S.131 page 39. Erase the sketch of the wireless mast on the last page, and substitute: "The mast can be erected according to either of the two diagrams below".



## II. - ARTILLERY CO-OPERATION.

The greater part of the work of a Corps Squadron is Artillery work. This is again divided into Counter-battery work and Registration. While the urgency of Contact Patrol, Reconnaissance, Photography, and Registration fluctuates with the changes in the tactical situation, Counter-battery work maintains the same level of importance throughout.

A programme of work is sent in each evening to the Squadron by the Artillery concerned, and is dealt with as follows:-

Nature of work.	Programme orders recd. from	Co-operation with what Batteries.	Carried out by B.F.C. Flight.	No. of machines.
O-B. Work.	Counter-battery Staff Officer.	Allotted Counter-Batteries only.	Two Counter-Bty. Flights.	10
Other work for Heavy & Siege Bty.	B.G.H.A.	Remainder of Heavy & Siege Battery.	} One Trench Flight.	4
Work for Div. Artillery.	C.H.A.'s or B.G.H.A.	Field Guns & Howitzers.		

For pre-arranged work, destructive shoots on hostile batteries etc., there will be no areas whatever.

When a Battery wishes to register a number of targets, target calls will automatically consist of Battery Call letter followed by the number of the target, according to the order in which they are taken on, e.g.

L1, L2, L3, L4. The battery call being L.

An Observer should call up the Battery he is going to observe for, before the shoot, and make all the necessary arrangements. If his machine, for any reason, cannot go up, he should immediately warn the Battery. If possible, he should see the Battery Commander after the shoot.

Wireless calls are sent in the following order :-

Squadron Call.	...	Letter.
Observer's Call.	...	Figure.
Battery Call.	...	Letter.
Target Call.	...	Figure.

The Observer's call and the Target call may be omitted after the first observation or correction has been sent down. Messages in clear are not allowed to be sent.

Read S.S. 131, pages 23 and 24, sec. 21.

In the case of Divisional Artillery a call is allotted to each Ground Station. If it is necessary to have a separate call for each Battery, an extra letter may be added after the Ground Station call.

Whenever an aeroplane calls up a Battery, a ground signal should at once be put out, generally K. The Operator should then warn the Battery Commander, and the signal L, or T, or  $\Delta$  should usually be put out next. If signals are more than 50 yards from a Battery, the Squadron should be informed of their co-ordinates.

See S.S. 131, page 31, Section 28.

Batteries in an exposed position may take up their signals when ranging has commenced. Should, however, a hitch occur, a ground signal should at once be put out. If this is not done, the Observer assumes the presence of hostile aircraft, and may waste much time looking for them.

AREA CALLS. (Now called "Zone Calls") Vide S.S. 131 Co-operation of Aircraft with Artillery, December 1913.

Oa.C. Groups, Brigades, or Batteries should keep the wireless operator informed as to what area calls he is to take. He should not be told to take more calls than are absolutely necessary.

The Divisional Artillery Commander can, if he pleases, instruct his wireless operator to take calls from whatever portion  
/of

of the line information is required.

When an area call is sent down, fire should be opened with as little delay as possible, to get the benefit of aerial observation, especially when the target sent down is troops on the move.

The Stations allotted to Divisional Artillery Brigades are intended to receive information in the zones in which their guns fire, and are not primarily intended for registration and ranging work, although they may at times be used for that purpose.

There should be a satisfactory means of communication between the Operator and Brigade Commander.

The general zone call is merely a means of sending down information. For examples of zone calls, see pages 23 to 29 of S.S. 131, "Co-operation of Aircraft with Artillery".

Whenever an urgent, or "fleeting opportunity" target is seen (such as a Battalion of Infantry in column of route), it will be preceded by the call "LL".

When an Observer sees a hostile attack, he will fly up and down the line of the hostile Infantry dropping smoke balls, one over each end of the enemy's attacking line, and one over the centre. He will also send down the co-ordinates of the centre of the attack with the call "LL", followed by the zone call.

When small bodies of Infantry, transport, or other troops are seen in the open "LL" will be sent down after the area call.

When a concentration is seen in the trenches, the area call only will be sent.

Wireless Operators should be warned to give precedence to all "LL" messages.

Brigades with masts should be warned to send all important messages back to their Divisional Headquarters, as Divisional masts may not get all signals.

/During

During subsequent operations, it is hoped to bring in a system by which Artillery Contact Patrols will keep the Artillery Commanders continually informed of the progress of our Infantry, thus enabling them to regulate their barrage accordingly.

ARTILLERY OBSERVATION falls under two headings :

1. Counter-battery work (see remarks in S.S. 131, Page 8, Sect. 10).
2. Registration.

O.K.'s should be reserved for direct hits on the point ranged on. If a hostile Battery is being engaged, an O.K. is a direct hit on the emplacement being ranged on.

Each message should be sent twice, clearly. After ten seconds, the message should be sent twice and no more. If, for any reason, an Observer cannot go on with a shoot, he should send O.I. with a short reason.

ARTILLERY PATROL. See S.S. 131, page 10, Section 12).

The duties of an Artillery Patrol are :

1. To locate hostile Batteries and to engage them, if active.
2. To reconnoitre all known gun positions.
3. To locate and mark on a map the position and extent of any new trenches.
4. To record any movement seen on the roads and railways in the Corps area.

There should be an Artillery Patrol up watching the front all day when ranging is not possible.

A Patrol should be up, weather permitting, even though it is impossible to fly over the German lines owing to low clouds.

Provided the occupants of the machine can see the ground at 1,000 feet, much useful work may still be done.

Gun flashes can be more easily spotted on dark days, and sent down under the area call though ranging may be quite impossible. These Patrols may have to be carried out some-way back over our lines.



COUNTER-BATTERY WORK consists of :

(a) Destructive shoots on hostile batteries.

(b) Neutralization of hostile fire.

(a) is the more important at all times except when our Infantry are in the open or are consolidating their positions, when effective neutralization is of first importance.

CALL NUMBERS.

Our Batteries should not have special call numbers of their own for hostile batteries. The call numbers of hostile batteries will be arranged between the Counter-battery office and the Squadron. In sending Area Calls, the co-ordinates of the hostile battery will always be sent in the first place, though the call number may be used afterwards in referring to the target.

Hostile Batteries are graded according to the following accuracies :-

A = Hit can be seen.

B = General position. Ends of battery known.

C = Not located accurately enough to be shot at.  
(See S.S. 131, pages 44 & 45.)

An Observer is not allowed to call up a Battery which is not allotted to his Flight for work. The use of aeroplane observation for registration of hostile batteries is not economical - the ultimate results of the registration seldom compensate for the loss of time which would otherwise have been used for destructive work.

DESTRUCTIVE SHOOTS.

The system universally adopted in this Army is as follows:-

The second emplacement from the right is the ranging point for all guns. All guns are ranged singly on to this emplacement, each correction being followed immediately by G for the next gun, so that corrections can only be put on the gun to which they refer. Each gun

/TWB

must be fired within 10 seconds of the "G", or failing that not until another "G" is sent. When the Battery Commander considers the guns are sufficiently ranged, he puts out "V" and starts single rounds of battery fire at two seconds interval. Battery fire at two seconds is better than a salvo, as the Observer can tell the number of rounds fired, and can observe the fall of all four rounds. A "mostly" correction will then be sent for the group. If one gun is very much out, it can be picked out, and a separate correction sent for it.

This emplacement generally remains the ranging point for all guns till destroyed. The Observer then sends a switch to another emplacement.

If a machine cannot finish a destructive shoot, owing to lack of petrol, it may be relieved in the air by another machine which will carry on the shoot. This machine, before it goes up, is kept informed of the state of the shoot through the Central Wireless Station.

CO-OPERATION WITH BALLOONS. (See S.S. 131, para 43, Section F1).

When a machine cannot finish a shoot, and no other machine is going up to relieve it, the shoot may be carried on by Balloon observation. In this case, the machine, sometime before it will have to go home, will send down the call "K.V.", with the co-ordinates of the target, which will be taken up by the Battery and the Balloon Section concerned. The Battery and Balloon will then get into touch, and the Balloon will carry on with the remainder of the shoot when the aeroplane sends "C.I."

NEUTRALIZATION. (See S.S. 131, Page 33).

Hostile batteries soon active are always sent down under the area call, but the Observer may in addition call up one of our Batteries to engage it, (see S.S.131, page 23 - 111).

/Then

When sent down under the area call, fire should at once be opened.

If the Observer sees where the rounds are falling "mostly" corrections will be sent.

#### REGISTRATION ON TRENCHES.

Aerial observation of shrapnel is seldom very reliable, particularly as regards height of burst, but good results as regards range and line may be given if the burst is kept very low so that there is a high percentage of grazes.

Registration for high explosive is straight-forward, but the methods of carrying it out depend upon the requirements of the Artillery. Where batteries are only using one gun, an Observer may range several batteries at once, or may range guns on several different points.

Where there is a very large amount of registration to be done in a very limited time, a very quick but rough method is as follows :-

Each gun to be registered fires four rounds at the same range and elevation. The Observer sends "G" to each gun, but in place of sending corrections plots the fall of the rounds on a large scale map, afterwards sending a tracing to each Battery.

#### WEATHER REPORTS. (See S.S.131, page 43).

The Balloon companies will let their respective Heavy Artilleries know the strength and direction of the wind at every 500 feet.

Weather reports are sent down by aeroplanes in the following form :-

W 45 N.W. 50 C 60.

= Wind at 4,500 feet N.W., 50 m.p.h., Clouds 3,000ft.

Any changes of weather when a machine is up should be sent down.

/The

12.  
The Anti-aircraft guns usually like to know the height of the clouds, so the Operator should be instructed to take weather reports.

FAILURES IN CO-OPERATION will be investigated by the Squadron and a report rendered to Wing Headquarters. (See S.S.131, page 42 Section 44.)

### III. - PHOTOGRAPHY.

PHOTOGRAPHS OF TRENCHES will be taken every day when possible, by the Corps Squadron.

PHOTOGRAPHY OF JOINTER-BATTERY AREAS will be taken as often as possible. The Corps Squadron are responsible for taking photographs up to a certain distance beyond the front line. The Army Wing will take the photographs required beyond this area.

Special advanced copies of these photographs will be sent direct to Heavy Artillery Headquarters. Photographs taken by the Army Wing will be sent via the Corps Squadron concerned.

If a photograph of any particular square is urgently required, a telegram to this effect should be addressed to O.C., IIIrd Wing.

The Squadron, Wing, No. of photograph, squares taken, date and time at which taken are shown on photographs, thus :

22 N 1388  
X 31.32  
15.10.13 - 4

### IV. - CONTACT PATROL.

During the course of operations, and whenever the situation with regard to the Infantry requires to be cleared up, a contact patrol machine is detailed to keep in touch with the Infantry and report their position to Headquarters. The Infantry assist the machine by lighting flares when the machine sounds a Klaxon horn.

20/1/1917

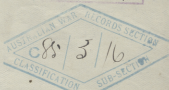
(sd) R. MACLEOD, Captain,  
Artillery Officer,  
III Wing, P.F.C.

407/26  
21.1.17

1/A.A./227/21.

G.O.C.R.A.

I Anzac Corps./



Herewith 40 copies of a "Summary of Artillery  
Directions" issued by the 3rd Wing R.F.C.

It is considered that they may be of interest to  
the Artillery.

29th January 1917.

Sd. G.E. BOSCAWEN, Capt. &  
Bt. Major.  
S.O. to G.O.C.R.A., Fourth Army.

2.

Headquarters,

1st Aust. Divnl. Arty.  
2nd Aust. Divnl. Arty. ✓  
4th Aust. Divnl. Arty.  
5th Aust. Divnl. Arty.  
Heavy Artillery, 1st Anzac.

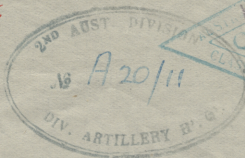
Herewith <sup>5</sup> copies of the above referred to  
"Summary".

R.A. 1st Anzac.

S1-1-17.

*Reidy*  
Captain R.A.  
Staff Officer R.A. 1st Anzac.

2nd Div Artly  
L159



G.H.Q. No. O.B./21  
Fourth Army G.S. 308  
1st Anzac 16/153  
2nd.D.H.Q. G.S./101

Fourth Army.

Confusion has occasionally arisen between the Artillery and the Royal Flying Corps as to the method of indicating the individual guns of a hostile battery. In future the right hand gun from the point of view of a man standing in the battery facing the direction in which the battery fires, will be called No.1.gun of the hostile battery.

(Signed) R.WIGRAM, Lt-Col.  
for Lieutenant-General.  
C.G.S.

G.H.Q. 9/2/1917.

C.O. Right Sub-Group  
C.O. Left Sub-Group  
C.O., 2nd.D.A.C.

The foregoing, which has been received from Fourth Army through usual channel, is forwarded for the information of all concerned.

2nd.Aust.D.A.H.Q.  
Feb. 15th 1917.

*Ca Clowes*  
Captain,  
A/Brigade-Major, 2nd.Aust.Div.Artly.

GENERAL STAFF,  
THIRD ARMY.  
No. *G. 3/355*  
Date *23.6.17*

HEADQUARTERS,  
1st ANZAC.

G. First ANZAC Corps, *27/6/17*  
22nd June, 1917.

Third Army.

"Instructions Regarding Co-operation of  
"Aircraft with Artillery."

With reference to Third Army No. G. 3/355 of  
13th June, with which copies of the above-named  
publication were forwarded "for distribution down  
"to battery commanders", I desire to say that only  
thirteen copies have up to the present come to hand.  
Could a further supply of 25 copies be sent, please,  
to enable distribution to the batteries, brigades, and  
headquarters of three divisional artilleries, and to  
corps headquarters?

*G.O.C.* *Wally*  
*has in*

Lieutenant - General,  
Commanding First ANZAC Corps.

II.

I Anzac Corps.  
-----

Herewith 25 copies.

*Refer to the file*

24th June, 1917.

Major-General,  
General Staff, Third Army.

JUN 25 Rec'd

*G.O.C.* *Wally*  
*has in*

Lieutenant - General,  
Commanding First ANZAC Corps.

G.O.C., R.A.

*received*  
*11/6*

COMMUNICATED BY AIR MAIL  
1. DISTRICT - ANZAC

TO THE COMMANDER:

RE: [Illegible]

[Illegible text]

1st ANZAC

First ANZAC Corps, 27/4/17.  
22nd June, 1917.

Third Army.

"Instructions Regarding Co-operation of  
"Aircraft with Artillery."

With reference to Third Army No. G. 3/355 of  
13th June, with which copies of the above-named  
publication were forwarded "for distribution down  
"to battery commanders", I desire to say that only  
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Could a further supply of 25 copies be sent, please,  
to enable distribution to the batteries, brigades, and  
headquarters of three divisional artilleries, and to  
corps headquarters?

*G.S.*  
*fully*  
*made*

Lieutenant - General,  
Commanding First ANZAC Corps.

received  
21  
6

G.O.C., R.A.



Third Army No. G. 3/355

1st ANZAC.

27/6/17

1st A.N.Z.A. Corps.

Forwarded herewith are copies of "Instructions regarding Co-operation of Aircraft with Artillery".

These Instructions will be adhered to in the Third Army.

Sufficient copies are forwarded for distribution down to Battery Commanders.

Page 6, line 10 should be amended to read :-

"If aerial observation is available not more than one of our".

Page 7, lines 7 and 9 from the bottom "ten minutes" should be amended to "fifteen minutes".

13 copies only  
received  
Sd/- M. M. C.

G. C. Grant Lt Col

Major General.

General Staff, Third Army.

13th June 1917.

Copy to :-

G.O.C., R.A.

No further  
copies  
received

21/6



2<sup>nd</sup> priority  
CO 4<sup>th</sup> ASA Bde  
5<sup>th</sup> ASA Bde



Herewith 2 copies of a  
"Summary of Artillery Directions"  
issued by 3<sup>rd</sup> Army R.F.C.

*L. D. Bealey*

20010000  
1/2/17.

Major

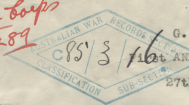


*File*

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Re-number

*H.P. First Corps  
289*



RECORDED  
1  
ANZAC.  
27/4/17

27th June, 1917.

2nd Australian Division.

"Instructions regarding co-operation of aircraft  
with artillery."

In compliance with the request contained in your G.25/277  
of 26th June, an additional copy of the abovenamed publication is  
sent you herewith.

*GGP*

Brigadier-General,  
General Staff,  
First ANZAC Corps.

*Pa  
27/6*

*38  
25  
26*

sent you 11 copies of the above-mentioned  
publication on the following scale :-

- Artillery headquarters 1
- Headquarters 1
- Headquarters 1

2. Please note the undermentioned amendments of the  
original texts -

- Page 6 paragraph (e) first line should read "If aerial  
observation is available not more than one etc."
- Page 7 lines 7 and 8 from the bottom - for "10 minutes"  
read "15 minutes".

*GGP*

Brigadier-General,  
General Staff,  
First ANZAC Corps.

SECOND AUSTRALIAN DIVISION.

HEADQUARTERS,  
1st ANZAC  
Divisional Headquarters,  
26th June, 1917.

HEADQUARTERS,  
2ND  
AUSTRALIAN DIVISION,  
(GENERAL STAFF.)

27/6/17

*G. G. G.*

First ANZAC Corps.

Reference your G.27/412 of 25-6-17:

May one additional copy of "Instructions regarding co-operation of aircraft with artillery" be supplied please for use in this office.

*Ga.*

*L. F. Arthur Major*

for Major-General,  
Commanding 2nd Australian Division.

JUN 27 Recd

sent you 11 copies of the following  
distribution on the following scale:-

Artillery headquarters	1
Machine gun headquarters	1
Signal headquarters	1

2. Please note the undermentioned amendments of the original texts -

Page 6 paragraph (e) first line should read "If aerial observation is available not more than one etc."

Page 7 line<sup>s</sup> 7 and 9 from the bottom - for "10 minutes" read "15 minutes".

*G. G. G. Major*

Brigadier-General,  
General Staff,  
First ANZAC Corps.

7107/11/17

1  
ANEAC.  
27/42

G.  
First ANZAC Corps,  
25th June, 1917.

Distribution

1/Aust. Div. Art. -	"
2/	"
5	"
- B.G.G. &	1
- G.O.	1
G.O.C.A.	2
G. Libany	1
	<hr/>
	38

12/5/16

regarding co-operation of aircraft  
with artillery."

sent you 11 copies of the abovenamed  
distribution on the following scale :-

Artillery headquarters	1
Headquarters	1
Artillery headquarters	1

2. Please note the undermentioned amendments of the  
original texts -

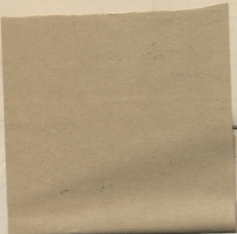
Page 6 paragraph (e) first line should read "if aerial  
observation is available not more than one etc."

Page 7 line<sup>s</sup> 7 and 9 from the bottom - for "10 minutes"  
read "15 minutes".

*G.G.*

Brigadier-General,  
General Staff,  
First ANZAC Corps.

110711



HEADQUARTERS  
1  
ANZAC.  
27/42

G.  
First ANZAC Corps,  
25th June, 1917.

1st Australian Division.  
2nd Australian Division.  
5th Australian Division.  
-----

"Instructions regarding co-operation of aircraft  
with artillery."  
-----

1. Herewith are sent you 11 copies of the abovesamed  
publication for distribution on the following scale :-

- Divisional artillery headquarters 1
- Each F.A. Brigade headquarters 1
- Each F.A. Battery headquarters 1

2. Please note the undermentioned amendments of the  
original texts -

- Page 6 paragraph (c) first line should read "if aerial  
observation is available not more than one etc."
- Page 7 line<sup>s</sup> 7 and 9 from the bottom - for "10 minutes"  
read "15 minutes".

*Handwritten signature: G.G. [unclear]*

Brigadier-General,  
General Staff,  
First ANZAC Corps.

WAR OF 1914-18  
Received from AUSTRALIAN  
NAVY SECTION  
MILITARY DIVISION

Classified 85/30

In-Boxed 75