APPENDIX - VII

The Scheme of Guerilla Operation prepared and partially implemented by Jayaprakash Narayan during the '42 Movement
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A.B.C. OF DISLOCATION

I offer here a plea for the special consideration of those of our fighters for Indian freedom who have been engaging in the work of dislocation as well as of those who wish to undertake this form of activity. Much valuable energy and resources are lost and workers sacrificed unnecessarily because of the ignorance of our workers and the lack of adequate knowledge required for successful actions. This plan should be supplemented by each group of workers with simple and precise instruction regarding the technic of underground activities. It is obvious that in the present phase particular attention should be paid to the problem of building up of a sound decentralised organisation and the work of preparation both in respect of man-power and materials.

PAHILA AZAD

AZAD DASTAS

The mass upsurge which marked the first phase of our Revolution has now declined. This should cause us no undue anxiety. It is in the nature of mass upheavals that they do not remain for long at the height of their intensity. Either a mass rising must secure within a short time its objective or...
its intensity must wane. The waning of its intensity, however, does not mean that all is over with it. In a revolution ups and downs are natural. The masses move forward and retreat and they move forward at one tremendous leap: for certain reasons they failed to reach their objective and retreated. It is certain that they shall advance again.

Three factors were responsible for the initial retreat of the Revolution; (i) lack of an organization to lead the resurgent masses; (ii) absence of a full programme of the Revolution; (iii) failure of all parts of the country to rise together.

The last of these is self-evident. The first two require some explanation. In those parts of the country where the people rose in all their strength, there was a tremendous release of energy. This energy was largely wasted because there was no guidance or direction as to how it should be spent. The people very early and with comparative ease completed the negative aspect of their task, viz. the destruction of the civil authority of the usurper power. But having destroyed the police stations, they did not know what further they had to do; they did not know how to create their own power and resist the reconquest of the liberated areas. The waste of energy and opportunity and the helplessness of the people are well exemplified in the case of the thousands of villagers who looted the military stores at the Barauni Junction, B.N.W.Rly. in North Bihar. It is reported that the people took possession of nearly 25,000
rifles and 30,000 rounds of ammunition, apart from other stores. With that material a fine people's militia could have been raised and a revolutionary government could have been organised in a few districts, which could have held in a few districts against the enemy for some time. The militia and the establishment of the revolutionary government might have influenced the police and the armed forces in the neighbouring districts and it was not improbable that the liberated areas had secured further adherents and expanded their territories.

The masses will take sometime to recoup their energy. Objective forces, such as the food and price situation, repression, propaganda, turns in the war will also take sometime to create the psychological atmosphere that would require only a spark to produce another mass explosion. We should utilize the present firstly to remove the deficiencies that were discovered to exist at the beginning of the Revolution, and secondly, to produce as soon as possible those factors which would again lead to a mass upheaval. One method (we should emphasize that it is only one of other methods) of doing this is to create in every district a band of shock troopers. A sort of advance guard, who should possess the proper technical and political training, and who should, in the manner of guerillas, wage ceaseless war against the enemy.

Let us call band AZAD DASTAS in Hindusthanee. The idea of these DASTAS, in the form of guerillas, is widely current. It is necessary to give concrete shape to these ideas and to get on
with the work without delay and without talk. In some Provinces these DASTAS already exist; their work in those parts has to be systematized.

It is intended to give directions and suggestions for the organisation of these DASTAS.

The nearest equivalents to our AZAD DASTAS would be European guerillas. The dictionaries define a guerillas as "one engaged in irregular warfare generally in small independent bodies". The term is derived from the Spanish "guerra" meaning war. It is said the guerillas were the main force which prevented Napolean from ever completely conquering Spain. Guerillas played an important part in the Russian Revolution and in occupied Europe today they are continuously harassing the Hitler regime. In occupied India our AZAD DASTAS can become the instruments of complete paralysis and demoralization of British rule. They can in time become the leaders of the mass insurrection and the nucleus of revolutionary people's army of the Republic of India.

There are 250 districts in British occupied India. In a district of average size 250 AZADs might be organised in five Jathas of 50 Azads each, which should further be divided into 25 Dastas of ten Azads each. It is suggested that every member of the Dastas should have the sur-title Azad added to his name; so that, if his name is Sher Singh, he should be known as Sher Singh Azad. In this manner our Azad would mean the same as the Spanish "guerilla" or the Russian "Partisan". To be known as
Azad would be synonymous with being a member of an Azad Dasta (a guerilla unit) of a Dasta as Azad Dastadar.

DISCIPLINE & OATH:

Each Dasta should be formed around a leader who should select and recruit his Azads and to whom the latter should pledge implicit obedience. All Azads and Azad officers must take the following oath of allegiance.

I, a citizen of the Republic of India and true son of Mother India, do solemnly pledge that I, as an Azad, shall not cease fighting the British usurper till the Republic of India is established and the free flag of the Republic flies from one end of country to the other.

I pledge my unquestioned loyalty to the Indian Revolution and do solemnly declare that I shall be ready to lay down my life in its service.

I pledge further to obey implicitly the orders of my officers and to observe strict military discipline.

Should I by weakness, cowardice or evil design, violate this oath and betray the interest of my people, may I suffer any punishment, including death, at the hands of my comrades.

When a Dasta is organized, its members will confirm their leader by vote or may elect another leader from among themselves. Their leader once elected, they should give him
unquestioned loyalty. It should be the concern of the leader to see that his Azads are properly clothed and fed and his Dasta has the necessary equipment and secures the necessary training. He should function, as far as possible not dictatorially but democratically, the decisions of the Dasta being as far as possible the result of joint consultations.

The AZADS and their officers should, as far as possible be young men with good physique and active habits.

WHO SHOULD BE THE OFFICERS?

THE AZAD DASTADARS and Jathadars may be political workers, school-teachers, college students, deserters from the army or the police forces. They should have some education including political education. The initiative in organising the dastas must be taken by such leaders. A Jathadar may select four suitable men and charge them each with the responsibility of recruiting nine Azads to form in this manner four Dastas should get specific sanction from the District organization for each dasta to operate. After this sanction has been secured each Dastadar with the help of his jathadar shall collect the necessary training of his Azads after which his Dasta should begin to operate in his locality.

For the formation of the Azad Dastas it should be possible to issue appeals to those who have deserted from the Army to join or form such Dastas. Where we contact with Indian regiments we should try to persuade suitable soldiers and
officers to desert with their arms and form or join Azad Dastas. This should be one of the important activities of the Army Dept. We should also try to persuade armed policemen to desert for the same purpose.

The experience of guerillas elsewhere shows that it is not possible for a central organization of them to be formed. Our Azad Dastas too cannot have a central organization. They can only be given general guidance and help the dissemination of technical advice. In the Provinces too it may not be possible to have a centralized organisation, but a loose co-ordination must exist between the districts and the Provincial Azad Dastas should be able to keep in touch with the district organisations. In the districts, however, there should be closer co-ordination and the five Jathadars must work together, so that there should be no confusion or duplication in their action. They should also be able to pool their resources whenever it is necessary.

To ensure smooth working and maintenance of discipline and also to ensure that the Azad movement does not get out of control and follows the policy we suggest an Azad Subedar who should be responsible for the general guidance of the Azad movement in the entire Province and to whom should be subordinated all the District Azad formations. The Subedar should appoint Azad Ziladars from amongst the Jathadars, to whom should be subordinated the Jathadars and all the Azad formations in the district. The Dastadars should, of course, be responsible and subordinate to their respective Jathadars.
FINANCE:

The financing of the Azad Dastas is a serious problem, but it is not insoluble if the Dastas are active and in touch with the people. It is impossible for the Dastas to be financed from the centre. Nor, has it ever happened in history that guerillas were financed by a central authority. Particularly in the matter of goods and clothing, guerillas have always been known to obtain their requirements from the people among whom they operated. The very basis of the operation of guerilla bands is that such support should be generally available to our Dastas.

Our Dastas should make willing collection of grain and other foodstuffs from the villages near which they operate. Appeals should be issued to village people to give the Azads what they can spare. It is estimated that there are a million sadhus in our country who do not work and are yet fed by the people. Our Azads if organized to the full strength herein suggested shall only be a sixteenth of this number and if the people are approached properly, they would not refuse to feed them. Bazars may be asked to contribute cloth and other necessaries for the Azads. In a district of 20 lakhs there will be 250 Azads on the average. It should not be difficult for district to feed and clothe such a small number of people. The only condition is that the Azad must be active and should on no account molest the people.
Another source of income from guerillas is raids on the enemy. Our Dastas should also utilize that source. They may loot mail bags, small post offices, revenue collection before they reach headquarters (so that it would be easy to loot them) other government property such as grain shops and other stores of the usurpers.

In this manner the Azad Dastas must finance themselves.

It should be mentioned here that it would be inadvisable for our Dastas to get mixed up with professional dacoits or other criminals.

PLAN OF OPERATION:

Past experience in Europe and Asia has shown that guerillas operate best in hilly or jungle tracts. There are in every province of our country many such tracts. These should be the main bases of our Azad Dastas. But it may be possible, in fact, it has been shown to be possible during the present Revolution itself, that guerillas may be able to operate in plain country also and have their bases there, when they are firmly rooted among the mass of our people.

What is the plan of operation of the Azad Dastas? Firstly, let us see what place these Dastas have in the general plan of our Revolution. Guerilla fighting has always constituted an important part of a people's war, or a revolution, but it has never been its main part. The Russian and Chinese guerillas of
the present days do not constitute the main part of armed forces of their country. But they serve to spread the spirit of resistance to the enemy far beyond the reaches of the regular forces, and thus help in mobilizing the whole people against their foes. In the conquered areas, particularly guerrillas keep up the spirit of resistance, harass and demoralize the enemy and prepare the people for a general rising.

Our Azads have a similar task. The main part of our Revolution is, of course, an open rebellion of the whole people. Such an open rebellion broke out in August and September last. A similar, nay, vaster rebellion is our immediate objective, and we prepare for it in various ways. An integral part of this work is the organization of Azad Dastas. In the absence of a mass rising, it is our Azads who will carry ceaseless war unto the enemy, who will harass him and dislocate and demoralize his administration. Their continuous conflict with the enemy will keep up and radiate the spirit of resistance and also be a training to the people in general in the acts of resistance. The Azad movement, further, will put in the field a tested and trained cadre of revolutionaries, who by virtue of intimate contact with the people, will become their natural leaders in this manner, the Azad movement would form a valuable part of the National Revolution and an important method of preparing for a general mass rising.

With the nature of guerilla work clear in our minds, we may proceed to a detailed consideration of the plan of action
of our Azad Dastas. The plan may be divided into three parts:
(1) Dislocation of communications and war-effort (2) Depriving
govt. treasuries and such like of monies (3) Raids for destruc-
tion of the centres of enemy's authority and for disarming
them.

(1) DISLOCATION

See "Instructions* Regarding Dislocation" published
elsewhere.

(2) DEPRIVING GOVT. TREASURIES ETC. OF MONIES :

In this connection the following actions are suggested:-

(i) looting of mail bags;
(ii) looting of post offices and railway stations;
(iii) looting of railway trains carrying government money;
(iv) looting of revenue collections before they reach
headquarters;
(v) looting of government grain shops and other
government stores.

(3) RAIDS ON CENTRES OF ENEMY AUTHORITY

The following raids may be carried out :-

(i) raid on police stations for disarming and destruct-
ton of records;

* Separately below.
(ii) raid on chowkies, patwari’s office, registration office, chungi office and other small and not-too-well guarded offices and destruction of the records contained therein and of other properties, where possible.

Looting of mail bags has been found very successful in Karnatak and parts of Gujrat. In Karnatak a number of railway stations have also been burnt down by dislocation bands. In Gujrat in the Broach District two police stations were raided by trained bands, and disarmed and records were burnt. In the second raid only 27 guerillas, whom we shall call Azads, took part. This was due to detailed planning and disciplined attack.

**ARMS AND EQUIPMENT:**

There is much irresponsible talk today and unnecessary running about for arms particularly rifles and revolvers. Many people seem to think that nothing effective can be done without fire-arms and they spend all their time either in talking about them or in securing and keeping them in safety. Often enough the arms when secured are useless, for there is no ammunition or there is no one who can use them.

We are anxious to emphasize that since killing and terrorism are no part of our programme, possession of arms is inessential for us except as means of self-defence for our Azads. They shall also be of value, when, in the event of a mass rising,
the opportunity arises to form units of the country's revolutionary army. For present action, however, arms are not an unavoidable necessity. Many effective forms of guerilla activity are possible without any fire-arms whatsoever such as dislocation of communications, looting of mail bags, etc., burning of offices and station. During such actions a few country weapons are sufficient for the protection of the Azads. In Karnatak where guerilla activities are the most widespread there is very little of fire-arms used.

Our anxiety is to remove the mentality, which is fairly common, that without rifles and revolvers nothing is possible. We have already indicated that the greater part of the Azad activities can be carried out without such arms at least for the present and for some time to come. If every district in India were doing today what, for instance, Belgaum is doing, we should have succeeded, without any large possession of fire-arms in bringing the administration of the enemy to near paralysis. And that would surely have been a signal for the people to rise again in all their forces.

Raids to disarm the enemy shall provide training to the Azads and enable the unfit to be eliminated. They shall also serve to undermine the foundations of the enemy's rule and hearten and embolden the people.

The equipment necessary for an Azad Dasta is suggested below :-
Training of Azads:

The question of training of Azads is important. Training includes political as well as technical training. As far as technical training is concerned, for the initial stages, at least, no special training is required except what comes through practice. For instance, how to climb a telegraph pole or how to use a plier or a hacksaw or how to make an incendiary packet (following written instructions) is a matter of a little practice or patience. This type of training is thus largely self-acquired.

Training can be given only on the "relay" basis. In one centre a trainer trains up, say 5 selected Azads. These trained Azads then train separately other small batches of Azads and so on. Any training centre where a large number of Azads and
a large amount of equipment have been collected is strongly deprecated.

We would further suggest that since the simpler forms of Azad activities do not require any special training, the plea that trainers are not available, should not be made an excuse for not immediately getting on with the work.

**IMMEDIATE TASK:**

At present Azad activities are being carried out in a very few parts of the country. There, too, the organisation has to be improved in many ways. In the greater part of the country, however, we have to begin on a clean slate and our Azad Dastas have to be organised anew. The first thing to do is to form the Dastas and Jathas. When a sufficient number of them has been formed, action may begin.

The plan of action has already been discussed. Ordinarily, people are inclined to indulge in heriocism and romanticism when they come to deal with guerilla fighting. We suggest that we approach the task with sobriety and a practical sense. Altogether too much time and effort have been wasted on trying to blow up bridges and on spectacular actions. Blowing up of bridges and a similar action are at present beyond the scope of our Azad Dastas. Later on when they have functioned for some time, select Dastas of intelligent and tried Azads might be formed for this purpose and the necessary expert advice and guidance might be made available to them. But at least for the
present we must concentrate on wide-spread, simple, easily learnt actions. The actions we particularly recommend are: (1) cutting of telegraph and telephone line; (2) the various forms of railway dislocation mentioned in the Instructions below; (3) incendiaryism - burning of the enemies's offices, stores, etc.; (4) looting of mail bags, post-offices, etc.

These activities would require no particular training and, if practised on a sufficiently wide scale, would prove to be very effective. Their effectiveness is to be judged by the effect produced both on the enemy and the people. From this point of view, wide-spread dislocation of even a petty type is to be preferred to a big but isolated action. The former trains up a larger number of persons, spreads the spirit of resistance over a much larger area, encourages and emboldens the people more and causes much greater demoralization in the ranks of the enemy than the latter. We are not opposed to big actions, but where resources are limited and beginning has to be made, we stress the dispersed rather than the concentrated form of action.

**INSTRUCTIONS**

(1) Sabotage of Communications.

The essential nature of our present Revolution has been described by the A.I.C.C. Radio as "atomization of the country". By atomization is meant the "break-up of the artificial shackles..."
of unity imposed upon the country". It means "not only... the putting out of action of rails and roads that coil round the country like a black serpent and collects its blood in central reservoirs, "but also "the much vaster effort of putting out of action the relation between village produce and city manufacture and the system of currency and taxation." The second effort is considered the much more important of the two and greater emphasis is rightly placed on it, because it involves mass effort and is therefore revolutionary action of a deeper nature. But the destruction of rails and roads is also important and the A.I.C.C. Radio considers it "indispensable". This action in August-September was the work of the masses, who instinctively knew that the rails and roads were the vipers that sucked their blood and make the rule of the foreigners possible. The intensity of the mass upsurge having declined for the time being, the cutting up of these vipers is not the work of our Azad Dastas, which too have their roots among the masses and draw their sustenance and sanction from them.

The chief means of communications are:-

(1) Telegraph and telephone lines and installations;
(ii) Railways;
(iii) Roads and highways;
(iv) Postal services;
(v) Broadcasting and wireless telegraphy.

We shall take these one by one.
(1) Telegraph and Telephone lines and installations. In this connection we shall select only the poles, insulators and wires and the receiving and transmitting instruments as our targets. The first three can be got at in open country for the last it is necessary to enter stations and telegraph offices. The first three are, therefore, easy targets.

(a) Poles:

These are of wood or steel. The wooden poles can be either cut with an ordinary saw or burnt down with the help of some kerosene, rags and a match-box. The steel poles can be cut by hack-saws. It takes half-an-hour to saw an average telegraph pole.

It is not advisable to cut any pole. Select a pole that is at a corner where the telegraph line takes a turn. If such a pole is cut through half way from the outer side of the angle, the tension from both sides would be sufficient to bring it down. Then again after every few poles there is a pole secured to the earth by wires known as guy-wires. Such a pole is a superior target; when its guy-wires are cut, the tension in the wires will bring the pole down even when it has been partially sawed.

When only a few wires are running over a pole, it saves time and labour to cut the wires rather than the poles.

(b) Insulators:

These are usually of porcelain and of glass. A hammer or a piece of stone may be fastened to a bamboo pole and the
insulators may be broken by just hammering at them. Time permitting, the insulators must be broken even when poles or wires have been cut.

(c) Wires:

All telephone wires are of copper; telegraph wires are of copper or sometimes of steel. These wires can be cut by pliers or wire cutters. The instruments can be bought at any hardware store in any town; if they are not available in the market, they can be made to sample by our smiths.

For cutting wires it is necessary to climb the poles. Climbing is easy and can be learnt by a little practice. With a piece of strong rope 12 feet long a loop can be made at the top of the pole and the Azad who has gone up to cut the wires may support himself by the loop.

Not any wire anywhere should be cut. Let a band of at least 3 Azads go for the job. One of them should remain on the ground. The other two should climb up adjacent poles — one of the poles should have double insulators; as explained above every six or seven poles there is a double insulator pole. Now both the Azads who have gone up should cut the wires on the inside of the two poles — i.e. the wires that are between the two poles, and they should do so almost simultaneously. This will make detection of the spot of damage more difficult.
Another method to put the lines out of action is to take a length of thin bare copper or brass wire, climb up a pole and wind one end of the wire around the pole and the rest of the wire around the telegraph or telephone wires; the winding should be so done that it is not visible from the ground. This would ground all the messages and the line would be out of order.

The tools required for all these operations are: ordinary saw, hack-saw, plier or wire cutter, copper or brass wire, 12 feet of strong rope, kerosene, rage, match-box, bamboo pole and a hammer or stone.

(d) Receiving and Transmitting Instruments:

Where access to stations is possible, these instruments can be destroyed by hammer blows.

Note: Life telegraph or telephone wires are harmless, as the voltage in them never exceeds 50 volts. A slight shock that may be felt is nothing to be afraid of; if the hands are wrapped in dry cloth no shock will ever be felt.

11) Railways: They may be broad gauge, meter-gauge or "light". Only a small portion of the total track will have double lines, the rest only single. Only over short lengths are trains run by electricity; otherwise they are run by steam which is generated by burning coal or to a small extent by burning oil. Electric trains are run with D.C. at 1500 volts.
(A) The vital points to be studied in connection with steam-driven railways are: (a) the water works near watering stations; (b) coal stacks; (c) the railway tracks; (d) bridges; (e) the signalling mechanism; (f) the telegraph and telephone lines along the track and the instruments inside stations; and (g) the engine. Except for (a), (b) and (c) all points are vital to electric railways too.

(a) Water Works: Without water engines cannot run; therefore water-works are important. Generally they are at some distance from the stations — so they can be easily got at. At the water works there are engines, pumps and pipe lines running up to the tanks. The vital parts of the engines and pumps can be destroyed by a heavy hammer. The pipe lines can be cut by a hack-saw or the nuts and bolts can be removed at joints with a spanner or pipe tongs.

(b) Coal Stocks: These can be set on fire by any ordinary method.

(c) Tracks, Rails can be cut with a hack-saw; it takes 45 minutes to do that. Cut a portion, say a foot long and leave it in place so that the damage may not be apparent to a driver; this will derail a train.

Another method to derail is to remove fish-plates; these are steel plates that join two rails together, and are secured to them by four bolts, a pair to each rail. The nuts are unscrewed by a suitable spanner, universal spanner or pipe tongs.
(d) Bridges: For demolition of bridges high explosives are required. For the present we shall leave them out of our general instructions. Where, however, the necessary explosives and expert advice are available, this item too should be taken in hand.

(e) Signalling mechanism: Where there are no electric signals as on railways run exclusively by steam the signalling mechanism consisting of handles, wires, the signals and lanterns; to put this out of order, cut the wires, break up the red and green glasses of the lamps. The signalling mechanism is very important and is easily dislocated.

(f) Telegraph and telephone lines and instruments: described already in Section (i) above. We lay special emphasis on the destruction of these lines and instruments, as without them trains cannot run and their destruction is easy.

(g) Engines are vital parts of a railway system, and there is only a limited number of them available. But to damage them special knowledge is required. It is desirable, therefore, to establish contacts with drivers, cleaners, oil will damage delicate moving parts and disable the engine. This is a simple method which can be effectively carried out with the co-operation of railway men. Special attention should be paid to it and our Labour Dept. should be asked to help.

Regarding this last item, care should be taken not to start the actual sabotage till enough railwaymen have been enlisted.
The vital points in an electric railway system are: the power house, transmission lines, receiving stations, substations, overhead lines, in addition to points under (A). To do damage to these requires expert knowledge and access to stations. Sometimes switch-gear and transformers are located in the open; they can be destroyed by rifle shots or stones thrown at them. There is one point, however, where we recommend we should concentrate it is the towers of pylons that carry the overhead lines. To destroy these does not require any knowledge or training and can be attended to by our Azad Dastas; the legs of corner towers are to be cut by hack-saws.

CAUTION: Take care that the overhead lines do not fall upon or touch the body as the towers fall; else you will die.

2. Industrial Sabotage:

It is not possible to give technical details regarding sabotage in factories, mills, workshops, mines etc. Regarding mines it may be possible to send instructions sometime later.

As for factories it must be noted that effective sabotage can be done only through workmen inside them. Therefore, as far as this kind of sabotage is concerned the most important thing to do within as short a time as possible, is to organise sabotage bands among the industrial workers. In every important industrial units there should be a sabotage band which should act on instructions from above.
Workers so organized would usually possess the necessary technical knowledge; otherwise mechanics and engineers should be available in the factories, who would be sympathetic and instruct the bands. The formation of these bands is the best preparation for industrial sabotage. This should be an important part of the work of the Labour Department.

3. On Incendiaries and Explosives

While incendiaries could be handled with comparative safety by untrained men, the greatest care should be taken in the production or employment of explosives, and only trained operators should be set on the work.

(A) Incendiaries: It is frequently forgotten that an incendiary can do no more than ignite — just START a fire; that the fire so started can spread and do much damage only if it burns a considerable time UNNOTICED and combustible materials are contiguously located; and lastly while no incendiary can ignite an incombustible material like concrete, brick-work or metal, even combustible material cannot burn unless it has an adequate supply of air.

The standard incendiary in modern warfare is the thermit bomb of a magnesium alloy which when ignited by burning thermit within it would burn for several minutes with an intense heat. Thermit itself is a well-dried mixture of one part of coarse aluminium filings and three parts of red oxide of iron; when it
burns there is no flame, but molten iron at 3000 degree C. is produced along with a slag of molten aluminium oxide floating above the iron. Thus thermit cannot set fire to materials high above it. It can ignite only materials with which the white-hot molten iron and slag can come into contact. To ignite thermit we may use a mixture of one part of fine aluminium dust (such as is used in paints) and two and a quarter parts of potassium chlorate, but even this mixture cannot be easily made to burn. A mixture of one part of sugar and two-and-three fourths parts of chlorate will catch fire on mere contact with concentrated sulphuric acid. If a blend of one part of sugar-chlorate mixture and two parts of aluminium chlorate mixture is interposed between layers of the two mixture, combustion will spread to thermit at the bottom.

From this description it will be evident that some of the materials like aluminium dust required for a thermit incendiary are not freely available everywhere, and the preparations of the incendiary is by no means easy. Further, although this incendiary gives a very high temperature, the quantity of heat it affords is in comparison small.

After a good deal of experiment we have evolved a simple and very inexpensive blend for our purpose, costing only about 4 annas for an 8 ounce charge, which would burn for at least 4 minutes and is capable of igniting even wood above it, provided a clear air-space of at least 3 inches is allowed over the
charge for the flame to play with un-impeded air supply. The ingredients used are 10 parts of potassium nitrate (nitre or salt-petre; they call it in Bombay), 2 parts of sulphur, 2 parts of dry saw-dust and 1 part of any oil, such as lubricating oil waste. The nitrate and sulphur are separately well-powered and sieved to get a fine grain. The mixture should be intimate. The charge may be placed in a card board box, and at its centre, in a small well made with a cylinder of wood, about an ounce of an igniting mixture of 1 part of sugar, 2 parts of sulphur and \( \frac{7}{2} \) parts of potassium chlorate is placed; and into the igniting mixture is inserted, mouth downwards a 1-dram bottle containing concentrated sulphuric acid, the mouth having been securely closed by a piece of rubber torn from a common toy balloon and tied tight over the mouth. The acid corrodes the rubber and after \( 2\frac{1}{2} \) to 3 hours comes into contact with the igniting mixture to which it then sets fire. The time device for ignition described here has been the most successful of several tried by us; and the incendiary itself, by its silent action, is superior to other proposed.

(B) Explosives: An explosive is a substance which upon suitable treatment develops a gas at a high temperature and pressure; and it is the pressure of the gas exerted equally in all directions which produces the blast with its destructive effect.

(1) Gunpowder: The first explosive used in history was a mixture of 75 part of potassium nitrate, 15 part of wood charcoal and 10
parts of sulphur, ground separately to fine dust and intimately mixed. This mixture is still the simplest to prepare and is called black powder or gunpowder. This mixture is still the simplest to prepare and so has to be separately mixed. The hose is water-proofed by impregnation with

When it is burnt in a shell or a bore hole in the material to be destroyed, if the pressure developed by a given charge is sufficiently high, the shell or material will burst and the fragments flying outwards in all directions constitute the splinters that injure persons they may encounter. For the bursting pressure to develop, the shell will have to be sufficiently thick and well closed, or the bore-hole will have to be tampéd air-tight with wet clay. After the introduction of the charge, when only a fraction of the charge has burst the pressure developed will be insufficient to burst the container after which the remainder of the charge, if the container is not sufficiently strong for a given charge, will burst. The ignition of a charge is effected by a fuze, which

fuze, which is a flexible hose of spun jute fibres, filled along its length with black powder. The hose is waterproofed by impregnation with asphalt. It requires machinery to prepare and so has to be bought for use from dealers in ammunition stores. One end of a length of fuze is cut square at right angles to the length and
imbedded in the charge, while the emergent end is cut at a slant with a razor blade in order to expose a larger area of black powder for easy ignition. A 2 foot length will allow one minute's time for the operator to withdraw to a safe distance.

If an interval longer than one minute is desired, up to ten minutes or slightly longer could be secured by inserting just enough of the emergent end of the fuze into the cold end of a lighted cigarette, so that the cigarette is held up in the air and does not get put out by contact with cold surfaces. Only in the nights will the glow be visible, and a thin wisp of smoke from the burning will be invisible by night while being scarcely noticeable by day-light.

In case a fuze is not available, a quick-match may be improvised by filling a drinking straw with the igniting mixture of sugar-chlorate-sulphur described under incendiaries. This mixture will burn exceedingly fast and so the straw will have to be inserted into the cigarette for time.

In case very long intervals are desired, the emergent end of the fuze may be inserted into a small charge of incendiary set to ignite by the time-device described above.

The destructive power of black-powder is intrinsically poor and limited by the characteristic property of black powder which requires that it should always be ignited in a container or bore-hole, closed or tamped to prevent the gases from its combustion escaping before the bursting pressure develops.
(2) High Explosives: For quick demolitions, what are called high explosives like nitroglycerine, T.N.T., gun-cotton and picric acid are employed. In contrast to black powder these possess much greater destructive energy and when they are "detonated" as described in the sequel, they get converted almost instantaneously into a gas - within a few thousandths of a second. The gas at the moment of detonation occupies only the space previously occupied by the solid which gave birth to it - but being in such quantity and at such high temperature, that, under ordinary atmospheric pressure, it would have occupied nearly a thousand times that volume, it exerts in all directions a pressure as many times atmospheric - several tons per square inch. This pressure would develop even if the high explosive is unenclosed or contained in no material stronger than paper and it would exert its destructive effect upon all structures to which it may be opposed.

The word detonation is used to describe this rapid conversion of a high explosive to the gaseous state. On simple ignition by a fuze, however, most high explosives will not detonate, but will burn off quietly like gunpowder - unless and in only a few instances, the high explosive charge is in such large quantity, that after a certain amount of it has burnt wastefully, the remainder may be raised to so high a temperature that the flame shoots through the entire mass with what is called the velocity of detonation characteristic of the high explosive.
There is, on the other hand, a certain class of unstable bodies like mercury fulminate and lead azide which detonate violently on every provocation—whether by ignition, percussion, or even contact with concentrated sulphuric acid. These bodies are called detonators, and if a small quantity of any of them is compressed carefully in a copper tube which is then imbedded in a charge of high explosive, however large, its detonation by ignition with a fuze would initiate the detonation of the entire charge of high explosive whose full energy will thereby be available for purposes of destruction.

(3) Chlorate-Oil Mixtures: The simplest high explosive that we could most easily compound is an intimate mixture of 9 parts of potassium chlorate and one part of kerosene. This is, however, expensive, to the extent that its major ingredient is costly.

The most powerful high explosive known is "blasting gelatine", which is nitroglycerine gelatinized by 7-8% of colloidion cotton—a variety of gun-cotton. Since however, the mixture is not very stable in the tropics, and the ingredients it requires are difficult and dangerous to prepared, we cannot, with the present resources, contemplate its manufacture as a possibility.

(4) Picric Acid: Next only to blasting gelatine in destructive ability is the high explosive picric acid, in the cast form. The raw materials required for its preparation are
crystalline phenol (carbolic acid, melting point 41°C) concentrated sulphuric acid (Sp. Gr. 1.84; 95% strong) and concentrated nitric acid (Sp. Gr. 1.4; 65% strong); while the pots used for manufacture may be the battery jars of 100 or 120 lb. water capacity made by Indian manufacture as at Morvi, out of acid-proof earthenware.

(a) Sulphonation: Melt 50 lbs. of phenol out of its drum into a jar. The drum is supported inclined over the mouth of the jar. Heat its sides with a blow-lamp, when the phenol will run out by a hole at the rim, while another small hole diametrically opposite will admit air into the drum as the melted acid flows out in a thin stream. Into the jar, then, add 100 lbs. of sulphuric acid. Stir with a stout glass rod (1" diameter), digesting the mixture over an oil bath at 120°C for not less than 3-4 hours. Cool. This process requires scarcely any attention.

(b) First stage nitration: With a large beaker transfer 45 lbs. of the sulphonated phenol to a jar cooled in a large tub of water, and add 30 lbs. of cold water or the mother liquor from a previous charge. Stir vigorously, while adding 15 lbs. of nitric acid, in small quantities at a time, spread over a time interval of 2 hours so that the temperature never exceeds 70°C and red brown fumes of nitrogen oxides do not arise.

(c) Second stage nitration: Transfer the whole of the charge from the first stage, without allowing it to cool, into a
thrid battery jar buried in asbestos powder or ashes in order to conserve the heat of the reaction. The temperature of the charge should not be less than 60°C. In the course of one hour add 15 lbs. of nitric acid, stirring vigorously after each little addition, when the temperature will rise to 120°C. Stir in a second lot of 15 lbs. and a third lot of 15 lbs. nitric acid rapidly, disregarding nitrous fumes and finish before the temperature drops below 100°C. The second stage of nitration thus requires 57 lbs. of nitric acid in all, and 5-6 hours. Allow to cool. Then add 40 lbs. of water, stir up and settle. From the crystals of picric acid decent drain off the spent acid which may be rejected except for the quantity used in diluting the sulphonated phenol in the first stage of nitration. Spent acid or wash waters, as they contain dissolved picric acid, must not be thrown away every day in the same place - as that would lead to localized accumulation of the explosive and eventual accidents.

(d) To the well drained crystals add enough water to submerge them, stir up vigorously by the hand, protected by gloves - and settle; drain out the wash water and repeat the washing two more times, draining well each time by leaving the jar inclined. Dry the well-washed and well-drained crystals in the sun, on an asbestos-cement board. Crystals not properly nitrated change red in the sun, while if they are not washed acid free, they will be hygroscopic, absorbing moisture from the air. The yield from 50 lbs. of phenol should be about 100 lbs. of picric acid.
Picric acid crystals are pale yellow when dry and deep yellow when wet, and very bitter to taste. The operator's clothes may stain yellow in working, but the dye will wash off from linen. If, however, the operator does not protect himself by rubber gloves, his hands will acquire an almost permanent and tell-tale yellow which can only wear out slowly. The crystals met at 120°C (121.60°C if pure) and their solubility in water is 1% (cold) and 5% (hot).

Picric acid is very stable and safe to handle, provided it is not allowed to contact any metal other than tin, since it forms an explosive series of salts, of which the lead picrate is the most dangerous. Picric acid will not be detonated even by a 2-gramme fulminate detonator (see later), if it is wet or cast into a block. But if a well at the centre of a block is filled by about an ounce of a "primer" of 57 parts of potassium nitrate and 43 parts of ammonium picrate - a fulminate detonator buried in this primer will, when ignited, initiate the detonation of first the primer and thence the entire block.

The preparation of picric acid slabs requires THE GREATEST CARE. The crystals are melted in a glass beaker over an oil bath at a temperature NOT HIGHER THAN 122°C fusion being facilitated by stirring with a glass rod. Molten picric is volatile and HIGHLY INFLAMMABLE. The melt is baled out cautiously into moulds of cardboard or rustless tins. After block has solidified a well could be bored in it with a wooden twist drill to take the primer and the borings could be returned to the melting pot.
(5) Ammonium picrate: The major ingredient of the primer is prepared by adding liquor ammonia drop by drop, in excess to smell, to a boiling solution of picric acid drained in water. The salt precipitates and after cooling and settling the crystals are drained on a suction filter and dried in the sun.

(6) Mercury fulminate Detonator: The detonator most easily prepared is mercury fulminate. Detonators are very sensitive bodies and only small quantities of them should be prepared at a time as they should be handled carefully in locations far removed from where high explosives are made or stored.

Pour 22 ounces of nitric acid (Sp. Gr. 1.36) over 2 ounces of mercury in a glass vessel and stir to dissolve. Cool and pour the solution into 20 ounces of methylated spirit in a large flask of 10 lbs. capacity. Warm, if necessary, for a short time, if the reaction is sluggish to start. Once started the action proceeds vigorously and the flask fills with fumes, the fulminate separating as a white powder. Towards the end the fumes redden, but subsequently clear up, and in about half an hour the reaction will have subsided. Settle, decant, and wash three times with water, draining each time thoroughly. Dry the powder first between folds of filter paper and then spread out in a warm dry dark place. Preserve the powder in a cool place in a paper covered stoppered bottle as it tends to absorb moisture and decompose in light.
A mixture of 8 parts of fulminate and 2 parts of potassium chlorate is used in detonators. The mixing is done with a soft brush or feather. Rubbing or pressure may lead to detonation. 1 gram of the mixture will suffice for chlorate-oil mixtures but 2 grammes are desirable for the primed picric acid block. The quantity is compressed carefully in a copper tube \( \frac{3}{4} \) inch in diameter and 2 inches long made out of thin sheet. Compression is by slowly leading a wooden plunger (or an old graphite rod for a discharged torch light cell), until a final weight of cwt. is reached. The weights should be laid gently as otherwise the fulminate will detonate. Handling fulminate requires the greatest care.

Ignition of the detonator is by fuze; the square cut end if inserted into the copper tube and while holding it pressed the tube at the top is pinched by pliers, so that the fuze is held tightly in position, as thus: The pinching should not be anywhere near the fulminate charge - else it will explode; and once the fuze has been fixed in the manner described, no pull should be applied to it. The tube is buried in the primer or explosive, taking care to see that while it is held tight in the charge, its pinched end is wholly above the charge and emergent clear of it.

(C) Demolitions: For quick demolitions, picric acid is the standard explosive in France, while gun cotton is the standard in England.
We have just now no practical experience in the use of picric acid for demolitions. If we use standard blocks of $1\frac{1}{2}$ lb., the number of such blocks required for any destruction is specified in Military Pamphlet No.7 of 1940 issued by the Government of India which gives the following formulae:

(a) By applying surface charges. The blocks are held tight along the whole length of the object to be destroyed and to obviate any air gap, a layer of wet clay is interposed.

1) For brick-work or masonry, arch rings, piers, walls: $N = \frac{3}{5} \times BT^2$

ii) For steel work-round: $N = d^2$; flat: $N = \frac{1}{10} \times BT^2$

iii) For rails, 90 lbs. or lighter one block applied against the rail, the space between the web and the block being completely filled by wet clay; three blocks applied at a fish plate, between the middle pair of bolts

iv) For timber: Flates $N = \frac{5}{2} \times BT^2$. Bounds: $N = \frac{5}{2} \times D^2$.

*In these form late B.T.D. refers to the breadth, thickness, diameter is feet; b.t.d., to the same dimensions in inches; and $N$ to the number of blocks required subject to a minimum of one block for a 6" length.*
(b) By pressure or concussion charges - for concrete and other structures. Tins containing 10 lbs. or 25 lbs. are used, covered by 20 sand bags to a tin.

The same military pamphlet suggests the addition of 5-10% of linseed oil to petrol stores at roadside distributing stations; while larger dumps are best destroyed by springing a hole in the tale with surface charges of explosive and either allowing the oil to leak out or better setting fire to it after it has run to the ground.

(D) Smoke Bombs: We have still no practical experience of the production or use of smoke bombs. Every smoke is characterized by what is called its total capacity power, measured in a specified way under specified conditions, and published date agree in allocating to the smoke from burning phosphorous the highest capacity; a smoke screen from phosphorous oxide is produced when shells exploding disperse yellow phosphorous in the air. But by reason of its high cost in the black market, the great difficulty in obtaining it at all, and its inherently dangerous nature, yellow phosphorous could not be considered by us as a raw material for smoke bombs.

The U.S. BUREAU of Mines have, however, devised a simple composition which on burning is claimed to give a satisfactory smoke. It is formulated as follows:-
Zinc dust | 34.5 | Ammonium chloride | 7.0
Carbon terachloride | 40.8 | Precipitated magnesium carbonate | 6.3
Sodium chlorate | 9.3 |

The sodium chlorate could be replaced by nearly an equal weight of pot. chlorate. All the ingredients of the mixture should therefore be available to us. But we must anticipate one obvious limitation of such a smoke source. One lb. of the mixture is said to burn for two minutes, and unless a smoke generating device builds up a screen for us almost instantaneously or within a few seconds, it is not likely to help us in covering a retreat which it is intended to do. Experiment alone can decide if the mixture formulated above will serve our purpose. In all cases, further, it must be recollected that the effectiveness of a smoke is very largely dependent on prevalent atmospheric conditions - principally the humidity of the air and the wind velocity, if there be air currents.