HEADQUARTERS SIGNALS COMMAND

OPERATIONAL INSTRUCTION PAMPHLET

No. 255

CARE IN THE HANDLING OF TEST EQUIPMENT

1. Information has been received from the Air Ministry that insufficient care is being taken in the handling of test equipment.

2. Strict instructions regarding the handling of delicate test equipment, where the care it receives may be in doubt, are, therefore, to be given to servicing tradesmen.

3. The following points are to be brought to the notice of all concerned:-

(a) Test Equipment in Transit

(i) Personnel involved in the despatch, reception and transportation of test equipment must be informed of their responsibilities regarding its care and safe handling. Adequate supervision is essential.

(ii) Test Equipment transit cases must be used.

(iii) Adequate packaging to approved standards is essential when special transit cases are not available.

(iv) Preferably, road transport is to be used for returning test equipment to depots, maintenance units and Calibration Centres.

(v) Specially fitted vehicles are to be used when available.

(vi) Rail transportation of test equipment should normally be avoided. When it is unavoidable, extra packaging precautions must be taken.

(vii) AVO Type instruments and all test equipment having moving coil meters should be switched to a "D.C. Amps." scale, or an appropriate scale, before packaging. (This allows the inherent moving coil "damping" action to operate and minimises the risk of damage to the meter movement).

(viii) Anti-vibration mountings must be clamped - or sufficiently "damped" - to obviate excessive movement within the transit case.

(b) Test Equipment in Use

(i) Connectors probes, attenuators, mains leads etc., must be disconnected before the instrument is moved.

(ii) Heavy instruments must not be dragged or jarred and must not be lifted or moved unless adequate assistance is available to ensure careful handling.

(iii) Electrical precautions for the safe handling and application of the instruments are to be observed. (Note: numerous instances have been reported of damages caused by high current flow from the equipment under test back to the test instrument. This is often attributable to unsafeguarded connection of instrument probes to valve anodes).

(iv) Personnel who are considered to be inexperienced in the application of test equipment are to be adequately briefed and supervised.

HEADQUARTERS SIGNALS COMMAND

OPERATIONAL INSTRUCTION PAMPHLET NO. 255

INTRODUCTION OF I.L.S. CHECKING MAST (MAST, TRAILER-MOUNTED, TYPE S.2/1.)

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ILLUSTRATIONS

REFERENCES

Test Equipment for Air and Ground I.L.S. ..... A.P. 2534G., Vol. 1

Instrument Landing System - Airborne equipment (A.R.I. 18011) ..... A.P. 2534E., Vol. 1

LEADING PARTICULARS

Function.	To check the elevation and azimuth patterns radiated by Glide Path and Localiser transmitters for Instrument Landing System at airfields.
Equipment.	Mast, Trailer-Mounted, Type S.2/1, (Ref. No. 5985-99-933-0798) comprising, An aluminium-alloy telescopic mast with three terylene guys; A petrol-electric set; An air-compressor unit; A height indicator unit; An aerial feeder-cable. Mounted on a two-wheeled, V-shaped, platform-chassis Glide Path Receiver, Type R1965) Provided from Localiser Receiver, Type R.1964) Unit sources. Field Test Set.
Power Supply.	Two 12-volt 100 A/Hr. batteries.
Overall Dimensions.	Prepared for transit, with electronic equipment, 16 ft. 8 ins long, x 5 ft. 4 ins. wide, x 5 ft. 6 ins. high. Weight, 1030 lbs. Without electronic equipment, weight, 960 lbs. Prepared for operation. Within circle of 24 feet diameter.
Ground Clearance.	7 inches, minimum.

THE I.L.S. CHECKING MAST

MAST, TRAILER-MOUNTED, TYPE S.2/1

PART 1. INTRODUCTION

1. The two main components of the Instrument Landing System, the **LOCALISER** and the **GLIDE PATH** transmitters, produce overlapping patterns in space to form beams.

2. To determine the suitability of these patterns for instrument approach or landing, requires an aircraft, fitted with measuring devices, to enable the beams to be examined to see they are within the tolerances for direction, width, straightness and range, about their equisignal zones.

3. If the ground equipment is in an incorrectly adjusted condition, the calibrating aircraft obtains data which is unsatisfactory and the tests have to be repeated after the ground equipment has been put right. This may mean several flights and is wasteful of flying effort and time. What is needed is some means whereby a preliminary check can be made of the beams on the ground before proceeding with the air tests.

4. In the case of the **LOCALISER** transmitter the measurements are in azimuth and limited provision has been made for establishing the position of the beam in the vicinity of the transmitter, by means of a battery operated portable course detector. The value of this measurement has been extended by fitting an aircraft receiver in a vehicle (R.V.T.634, described in A.P. 2542BF) which can be used at the touchdown end of the runway. The position of the beam centre line and the edges can be defined accurately with respect to the runway by its means. Measurements can be made with this vehicle at distances up to 5 nautical miles, depending on local conditions. However, the measurements are all at about 10 feet above ground level and may not be true for conditions at 50 to 100 feet; that is, as seen by an approaching aircraft.

5. To measure the **GLIDE PATH** patterns, which are used in elevation, no devices are available which can reveal the state of the beam. The problem is therefore to devise means of measuring the glide path in space. At the same time an improved method should be sought to give a more realistic indication for the **LOCALISER**, by taking readings 50 to 70 feet above ground.

6. A solution to both problems has been found in mounting a small dipole on a mobile telescopic mast which can be raised to any desired height from 12 feet to 75 feet. The signals received by this dipole are fed into a localiser or glide path receiver as required, and the output values displayed on a suitable meter for analysis. At the same time an indicator on the mast measures the height of the dipole above the ground.

7. The measurements are made at the touchdown end of the runway and the edges and centres of both beams can be defined with considerable accuracy at a point in space where the aircraft needs precise guidance.

PART 2. DESCRIPTION

1. The Mast, Trailer-Mounted, Type S.2/1 (Ref. No. 5985-99-933-0798), is a mobile, telescopic, pneumatically-operated unit, mounted on a two-wheeled, V-shaped, platform-chassis, together with a petrol-electric set, an air-compressor unit, a height indicator unit, an aerial feeder-cable, and three terylene guys with associated triple drum and winch. Provision is made for the carriage of two batteries and other items of electronic equipment.

2. The guy winches and height indicator unit are operated by individual electric motors powered by the battery. The air-compressor is belt-driven from the petrol-engine. The direct-coupled generator of the petrol-electric set supplies charging current to the battery and, for starting, the generator can be motored by the batteries to start the petrol engine. The battery may be used floating across the generator, or not, as desired.

3. Two outrigger struts of steel-lattice construction are hinged to the platform and can be swung out, one from each side, to stabilise the assembly during operation. The mast, when erected, is self-supporting, but the three terylene guys, whose lengths are adjusted automatically for any mast height, are fitted to check sway when the mast is operated in a wind. On retraction of the mast, the aerial feeder cable is self-winding on to a conical bollard.

Equipment (Mechanical and Electrical)

4. The telescopic mast used to support the dipole is a commercial product designed in collaboration with the R.A.F. to suit it to the particular role of an I.L.S. probe. Refer to Figs 1 and 2.

5. The mast is of tubular construction in sections of decreasing diameter to provide the telescopic action. These tubes are so fitted as to be air tight and thus provide the principal feature of the mast which is the raising to various heights by compressed air. Air is a most convenient medium as it is always available can be easily maintained at a constant pressure, and, in the event of leakage, has not the disadvantages of a fluid.

6. The supply of compressed air is derived from a small compressor driven by a petrol engine. The pressure required is 20/25 lbs. per sq. inch.

7. The petrol engine is of 120 c.c., 4 stroke, and drives a single cylinder air compressor ($2\frac{1}{2}$ c.f.m.) by means of a belt. Refer to Fig. 3.

8. An electrical supply, required to operate ancillary equipment as well as provide starting facilities for the compressor engine, is obtained from a 300 watt 24 volt generator (direct coupled to the engine), which charges a 24 volt lead-acid battery, 100 A.H. capacity. This battery supplies the external circuits as well as providing the starting current.

9. Raising of the mast is accomplished by a single lever-controlled valve admitting air to raise the mast. This control can also shut off the air; hold the mast at the desired height; or release the air to allow the mast to collapse under the weight of the sections.

10. The mast can be raised to its maximum height in 5 minutes and lowered in one minute. The height to which the mast is raised is displayed on an odometer type indicator with a range of 0 to 99 feet in 1 inch steps and tenths.

11. An extension tube, fitted to the last (upper) section of the mast, carries the dipole aerial. The signal collected by this dipole is transmitted to the receiving apparatus by means of a coaxial feeder (Uniradio 70) suitably guided down the side of the mast and accommodated on a conical winding drum. This drum is fitted with a rotatable coaxial plug and socket so that the signal can be fed into the receivers while the drum is turning.

Equipment (Electronic)

12. The receiving and metering apparatus is supplied in two parts; a tray, with protective cover, comprising standard ARI 18011 airborne receivers for localiser, marker, glide path and the usual ancillaries together with a control panel - referred to as a Field Test Set - which switches the receiver output into the appropriate meter circuits. Refer to Figs. 4 and 5.

13. The receiving equipment is described fully in A.P.2534G, Vol.1, together with setting up procedures and maintenance. Refer to Section 2 Test Rig (Installation) Type 5.

14. The signal leaving the A.R.I. 18011 receivers would, in the case of an aircraft installation, be fed into the pilots' meter type 7 to show the usual "Fly left", "Fly right" and "up" and "down" deflections. This meter has scale marks which were never intended to be used for fine measurements and so a different form of presentation has been adopted for use with the mast and probe.

15. A separate unit, the Field Test Set, is provided consisting of a metal case with a detachable front panel upon which the following items are mounted. Refer to Fig. 5).

(a.) Microammeter, Centre zero, 250-0-250. IND. CURRENT.
(b.) Milliammeter, 0-1. FLAG CURRENT - BATT CHECK.
(c.) Circuit Switch. Off-LOC-G.P.-UNSTAB. VOLTS-STAB.VOLTS
(d.) Meter multiplier Switch. X1-X5
(e.) 3-way power supply plug. PL.2
(f.) 12-way Signal input plug. PL.1

16. The Centre zero meter indicates either Localiser or Glide Path modulation differences in terms of microamperes. The zero position indicates balance or beam centre. Deflections to left or right, indicate the position in the beam up to the edge which is defined by a reading of 150 microamperes.

17. The 0-1 Milliammeter Marked "Flag Current". Batt. Check," serves the dual purpose of checking the battery voltage and indicating the flag current.

18. The circuit switch has 5 positions, the first of which is "OFF". The second position is marked "LOC" and switches the incoming Localiser signal to the meters. The Course line signals appear on the microammter and the flag current appears on the milliammeter. The 3rd position is Marked "G.P." and feeds the signals from the Glide Path receiver to the meters, after removing the localiser signals. The 4th position "UNSTAB.VOLTS" applies the battery voltage to the milliammeter. This voltage is nominally 24V, the corresponding reading for this on the milliammeter is 0.5. The 5th position "STAB.VOLTS" applies the stabilised 19V supply to the meter which will indicate 0.39 as the corresponding reading.

19. The scale multiplier switch is marked XI (up) and X5 (down). In the 'up' position the Microammeter scale is direct reading. In the 'down' position the scale reading is one fifth of the actual indication; that is, multiply by 5 for true reading.

20. The 3 way plug, (PL.2), couples by means of an external connector to the receiver unit to obtain the necessary D.C. potentials for monitoring.

21. The 12 way plug (PL.1) is connected by an external connector to the receiving unit and carries the localiser and glide path signals to the switching circuit.

22. The Receiver Unit is self contained and is located on the chassis of the mast adjacent to the battery box. It slides into position on the two horizontal chassis members, and is secured by spigots at the rear and captive thumb screws at the front.

23. The Field Test Set is mounted on the upper member of the trailer framework adjacent to the Winch box. It is readily detachable and is located so as to be convenient for reading the meters and operating the mast air control valve. A loose cover is available for protection from the weather.

PART 3. OPERATION AND USE

1. The function of the equipment is to make accurate measurements of the direction and width of the beams at individual Stations. For these results to be achieved consistently the mast must always be sited in the same place. To ensure easy deployment to the correct spot, surveys have been made of selected air fields and markings or markers provided on the taxiways or the grass verges. These marks are at measured distances from the Glide Path and the Localiser so one value in the calculation is always

a constant for the Station concerned. All these positions are in the approach lane and near the touch down area, it is, therefore, essential to carry out the tests in close co-operation with the Air Traffic Controller as the mast constitutes a hazard to both airborne and taxying aircraft. Before moving the mast to the sites the Air Traffic Controllers' agreement must be obtained that the tests may be carried out and the operating team must be prepared to lower the mast at a moment's notice and remove same from the site.

Preliminary Checks

2. Before moving the mast on to the Site the following checks need to be made:-

(a) An adequate supply of petrol and oil is in the engine tanks.

(b) Start the engine and when it is running smoothly, check that the pressure gauge is indicating that 25 lbs. (Max) per square inch is available and that the battery is charging. Switch off.

(c) Fit the receiving equipment unit with a set of I.L.S. receivers already checked in the servicing bay.

(d) Ensure that the correct crystals are in the controller and select the channel required.

(e) Slide the unit into place and secure.

(f) See that connectors are in place for the battery and Field Test Set.

(g) Start the engine again and check the Voltage across the battery by putting the switch on the Field Test Set to "UNSTAB. VOLTS". A reading of 0.5 $\pm$ 0.01 on the scale should be obtained with the receiver switched on. Leave the receiver running for ten minutes to warm up.

(h) Switch to "STAB. VOLTS" and check that the reading is 0.39 $\pm$ 0.01 .

Setting-Up. Glide Path

3. Having ascertained that all supplies are correct, stop the engine and tow or man-handle the mast to the position on the taxiway, or grass, represented by 'A' in Fig. 6.

4. The trailer should be located so that the base of the mast, when in the upright position, lies over the appropriate mark on the ground.

5. Extend the outrigger struts to give the trailer a 3 point, stable base. Adjust the jacks for level. Unwind the three Terylene guys from the cleats and slip them over the jockey pulleys on the outriggers and the towing member. Fit and adjust the dipole so that it is broad-side to the transmitting aerial.

6. Start the engine and when the voltages, as indicated on the meter, are steady the measurements may be proceeded with. Set the Field Test Set switch to GLIDE PATH. Connect the coaxial cable from the dipole to the glide path receiver. Switch on the Receiver.

Operation

7. Move the air-valve control lever to the 'Up' position; the Compressor will supply air to the mast which will commence to rise. The sections do not extend uniformly but this is immaterial.

8. Watch the microammeter as the mast rises. At the commencement it will probably read full scale or 250 microamperes. As the mast rises, this reading will fall toward the centre zero. When it reaches 150 microamperes the air-control lever should be moved to 'HOLD' and the mast rising stopped.

9. If the mast has risen a little too high and the meter reads below 150 microamperes, the air-control lever is moved to the 'DOWN' position briefly and the mast "inched" to a point where the meter reads 150.

10. Note height indicated on the measuring device. This corresponds to the height of the lower beam edge above ground at that point.

11. Raise the mast higher until the reading on the meter falls to zero. Adjust the height to correct any overshooting and take another note of the footage indicated. This corresponds to the centre line of the glide path beam.

12. Raise the mast still higher and note that the meter commences to read in the opposite direction. Stop the mast when a reading of 150 is obtained and adjust accurately.

13. Record the height indicated; this final figure is the height of the upper edge of the glide path beam.

14. Now raise the mast until the meter reads 250 microamperes or, if this figure cannot be achieved, some figure well above 150.

15. The next step is to repeat the previous measurements in the reverse direction by taking the height readings as the mast falls, i.e. at 150, 0 and 150, microamperes.

16. These readings will be substantially in agreement but should be averaged. If there is any uncertainty, repeat as required.

Data Analysis

17. Having thus obtained and confirmed a value for the height of the dipole at the edges and centre of the beam, the following examples shows how to determine the beam angle from the data recorded. Refer to Fig. 7.

If Horizontal datum line from the transmitter mast base, D = 1000 feet

Difference in level between transmitter mast base and standing for trailer, L = 2 feet

Zero setting of test mast, S = 12 feet and,

Indicated height at zero centre reading, H_2 = 54.6 feet

the true value of the dipole height is 52.6 feet and the tangent of the angle required is given by:-

$$\frac{H_2 - S}{D} = \frac{52.6}{1000} = .0526$$

$$= 3.01 \text{ degrees.}$$

18. The angles of the upper and lower edges of the beam may be obtained similarly by substituting the true values of H_1 and H_3.

19. As the distance is constant and the level is not normally expected to change, a chart or curve should be prepared to facilitate the transfer of height measurement into degrees.

20. Ideally, this measurement is made at, or immediately following, an air calibration. Various factors may combine to make the answer different from the figures obtained by the aircraft. This does not necessitate any action and is no detriment to the value of the measurement but these figures must always be obtained after any transmitting adjustments have been made because they are the equivalent values of the beam as seen by the aircraft at that part of the approach.

21. These figures are recorded and if adjustment or repairs are carried out to the transmitter aerial system of a nature likely to cause a change in beam characteristics, then a check must be made by using the mast.

22. After any re-setting of the transmitter aerial which is found to be necessary either as a result of repairs or aircraft reports, the values must be within 1% of the standard recorded values of H1, H2 and H3, before calling for an air calibration or the beam returned to service.

Setting-Up Localiser

23. The primary difficulty which has been overcome by means of the telescopic mast, is the investigation of the vertical patterns of the Glide Path which formerly could only be resolved by airborne equipment. This

advantage can also be extended to measurements of the Localiser beam in azimuth because the test can be made with the dipole aerial in virtually the same point as the aerial in an aircraft at a critical point in its approach.

24. The Glide Path measurements, being made in the vertical plane, only require one operating point for the mast. The Localiser figures are obtained in azimuth and therefore require three points on the ground at which the signal is measured. Refer to Fig. 6.

25. When the Localiser is in line with the runway, the centre of the beam should be found on the centre of the runway at the point B. in Fig. 6.

26. The width of the beam varies between 2 and 3 degrees depending on the distance between the Localiser and the Glide Path. For a 6000 foot runway this distance is of the same order which will result in a beam width (preferred) of 2.6°. The physical width of the beam as measured at C and D at each side of the runway will be found to be of the order of 330 feet. Note that these values are really half-beam widths which is convenient terminology for practical work.

27. Where siting difficulties exist which have resulted in an offset installation being fitted, the distance between the Localiser and Glide Path is often seriously curtailed and may be tending towards a theoretical but unworkable minimum of 3,000 feet. Every effort is made to avoid any distance less than 3,500 feet. At this spacing the beam angle is 2.75° (pr ferred) and for a 6,000 foot runway with the point of intersection at 860 feet from threshold, the beam centre will be found (approximately) at the position E in Fig. 6. The edges will be found near F and G. The distance from the centre being of the order of 245 feet.

28. To make the measurements for the Localiser check, the mast should first be located at the mark for the beam centre (E. Fig. 6).

29. With all equipment warm and ready, the mast should be elevated to 53 feet. At this position the reading on the microammeter should be zero. If, for example the beam-width at the Station is 2.6° (= 150 microamperes) then the sensitivity is 57.7 microamperes per degree. Since the accuracy required is $\frac{1}{10}$ th of one degree (5.77 microamperes) then a figure of up to 5.7 microamperes either side of zero is acceptable.

30. Having established that the beam course line is correct (i.e. within the limits) then the mast is lowered and moved to position F or G.

These points represent the beam edges as measured for the station and a reading of 150 microamperes should appear on the meter with the mast raised to 53 feet.

31. The beam-width limits vary from 2° to 3° as displayed graphically on Fig. 8. The limits are obtained by reference to this chart and if a reading different from 150 microamperes appears, then the equivalent angle can be calculated from the sensitivity. This angle must be between the limits obtained from the chart or is laid down for the station in the installation details.

32. This measurement must be made for both beam edges in order to detect any unacceptable asymmetry as well as to establish the angle.

33. Should the requirements of the beam not be met during these measurements, adjustments must be made to the transmitter concerned and the test repeated until satisfactory figures are obtained.

Preparation for Transit

34. At the conclusion of the tests the mast is restored to the stowed condition and removed to the accommodation provided for it in the vicinity. The Receiving Unit remains in situ unless it is necessary to carry out adjustment to the receiving apparatus settings or if the trailer has to be towed by a vehicle to accommodation some distance from the site.

35. To remove the Receiving Unit, the aerial lead, and other connections are detached from their appropriate sockets and the tray freed by release of the captive screws. The unit is then removed as a whole, to the glide path building or workshops as required.

36. The Field Test Set should also be removed at the same time as it provides the receiver load and measuring circuit.

37. The Receiver Unit and the Field Test Set are anti-vibration mounted and, if necessary, could remain on the trailer when being towed by a vehicle. The equipment will, however, retain its accuracy for longer periods of time if it is subjected to the minimum amount of mechanical shock. Its removal is therefore recommended rather than undertake a prolonged journey over rough ground.

ANNEX A TO
OIP No 255
(Amendment No 3)

OPERATING INSTRUCTIONS FOR ILS BEAM CHECKING USING THE TELESCOPIC MAST TYPE S.2/1

1. It is essential to check the following requirements before attempting to make ILS beam checks with the telescopic mast.

Check that clearance has been given to proceed on to the instrument approach end of the runway by the station SATCO.

Check that the airborne receivers to be used on the mast trailer are serviceable and have recently been satisfactorily calibrated.

Check that the correct value of crystals are available for satisfactory reception of localiser and glide path signals of the installation to be checked. The values of these crystals may be calculated using the following formulae.

a. $fXtal = \frac{(fL - 28.6)}{8} \times 1000$

where fXtal = Localiser crystal frequency in Kc/s
fL = Localiser beacon frequency in Mc/s

b. $fXtal = \frac{(fG - 54)}{18} \times 1000$

where fXtal = Glide Path frequency in Kc/s
fG = Glide Path beacon frequency in Mc/s.

Fit the receivers to the auxiliary unit and secure them tightly, checking that the load screws on JB 159 are in the correct positions, i.e. 1 indicator, 1 Flag.

Fit the appropriate crystals in the control frequency selector and replace the retaining cover plate.

2. Fit the weatherproof cover to the auxiliary unit.

Position the auxiliary unit on to the trailer behind the battery box, and secure it by the two locking screws.

Fit the Field Test Set to the trailer beside the winch drum and lock it in position with the two channel taper pins.

3. Expose the cable sockets on the auxiliary unit by lifting the cover flap, then
a. Fit the connecting cables (2) between the auxiliary unit and Field Test Set, such that they will not interfere with the use of the guy ropes.
b. Fit the appropriate connector between the battery box and the auxiliary unit.
c. Fit the cable between the cabin and the localiser receiver (assuming the localiser beam will be checked firstly).

4. Check that the batteries are fully charged and secured in position.
Check that adequate fuel is in the petrol tank.

Secure the towing eye of the trailer to the towing vehicle ensuring the hand brake is released.

Before towing commences check that all trailer feet are secured in the "up" position.

5. The mast may now be towed to one of the checking points marked on the runway or perimeter track in accordance with OIP 255, Fig 6.

Tow the trailer to one of the pre determined crosses on the runway, lower and secure the front trailer foot.

Disconnect the trailer from the towing vehicle and manoeuvre it such that:

a. The mast base clamp is directly over the runway marking.
b. One guy rope will face directly into the wind.

When these conditions have been satisfied, apply the trailer hand brake.

Adjust the front foot height until the mast barrel is horizontal with the ground, and lock it in this position.

Let down the two rear trailer feet and lock them.

Remove the transit safety rod from the two outrigger feet.

Raise the outrigger retaining catches and swing the arms out to their limits.

Drop the outrigger feet and lock them in position.

/ 7.

6. Remove the dipole section from the transit position and insert it in the aperture at the mast head, after removal of the cross bolt.

Replace the crossbolt and align the dipole if necessary so that when the mast is raised to the vertical position the dipole will face the transmitting aerial of the facility under test.

7. Unwind a few turns of the Duradio 68 feeder cable from the conical bollard, feed it through the guide loops, and plug the cable end into the dipole socket.

Ensure the weight of the feeder cable will not be placed on the dipole socket when the mast is vertical; adjust the distance clamp if necessary.

Open the saddle clamp.

Extend the height indicator wire from its winch drum to the peg on the topmost section of the mast, feeding the wire through the guide loops.

Slacken the clamp bolts at the mast pivot point.

Untie the guy ropes and leave them slack.

Ensure the Duradio 68 feeder cable is slack and not caught beneath any protrusions.

Open the mast base clamp (adjacent to the auxiliary unit).

Raise the mast from the horizontal to the vertical position and lock it by securing the base clamp.

Notes a. This operation should be carried out by two persons, one either side of the pivot point.

b. As the mast barrel is raised from the horizontal position a red indicator lamp on the winch drum control panel should light up, indicating that electrical supply to the winch motor is available. Failure of the lamp to light up should be investigated immediately.

Tighten the locking bolts at the pivot point.

Pass the three guy ropes over the appropriate pulley wheels.

8. Check that the charging rate potentiometer is in the max (clockwise) position.

Temporarily earth the sparking plug of the petrol set, and move the compressor off the compression stroke by turning the drive belt. Remove the earthing strap from the sparking plug.

Pull out the choke control on the petrol set.

Ensure the airflow control lever is in the DOWN, or HOLD, position.

9. Press the electrical start button of the petrol set, when the engine fires, replace the choke to the running position. Should the engine fail to start through poor battery capacity, the hand recoil starter should be used.

With the petrol set running, adjust the charging rate potentiometer for current of 5 to 10 amps.

Press the 24 volt supply button on the auxiliary unit, the red indicator lamp on the control frequency selector should light up.

Check the stabilised 19V, and the unstabilised 24 Volt supplies on the field test set, finally set the selector switch to the facility under test.

10. Set the height indicator to zero feet.

Release the winch drum brake by turning the knob fully anti-clockwise.

Put the control lever in the UP position; the mast will immediately commence to extend so that care must be taken to ensure the feeder cable unwinds smoothly off the conical bollard.

The potentiometer control on the winch drum control panel will now adjust the tension on the guy ropes.

Raise the mast to the predetermined height and put the control lever in the HOLD position.

Observe and note the flag and micro ammeter readings on the Field Test Set.

Repeat guy tension and mast holding checks as necessary.

Select the DOWN position for the control lever, immediately the mast will lower. During this time the feeder cable should again be coiled on to the conical bollard.

When the height indicator shows zero feet again the mast is fully deflated. The petrol set may now be stopped by earthing the sparking plug.

Press the 24 Volt circuit breaker on the auxiliary unit, to remove the 24V supply.

/ 11.

11. Detach the guy ropes from the pulley wheels leaving them unsecured.
Lock the winch drum by turning the brake knob fully clockwise.
Slacken the locking bolt at the pivot point and unfasten the securing collar at the mast base.
Again with two persons, (one either side of the pivot point) gently lower the mast into the horizontal position.
Note a. Ensure a slack unrestricted feeder cable during the lowering operation.
b. Guard against crushing the feeder cable in the cradle.
Disconnect the feeder cable from the dipole socket and stow on the conical bollard.
Disconnect the height indicator wire from the mast head, and attach it to the drum housing.
Close and fasten the mast cradle clamp.
Remove the dipole assembly cross bolt and transfer the dipole assembly to the transit position, clamping it tightly in position.

12. Raise and clamp the outrigger feet.
Swing in the outriggers and replace the outrigger safety rod.
Stow the guy ropes around the pegs provided on the trailer frame.
Raise and clamp the two rear feet.
Attach the trailer towing eye to the towing vehicle and release the hand brake.
Raise and clamp the front foot.
The mast may now be towed away.

13. If there is an urgent air traffic requirement for the mast trailer to be cleared from the runway touchdown vicinity while beam checks are being made, and the mast is fully or partially extended; the following temporary transit procedure may be adopted:

a. Select the DOWN position at the control lever, immediately the mast will lower. During this time the feeder cables should again be coiled on to the conical bollard, until the height indicator reads zero.
b. Detach the two guy ropes from the outrigger pulley wheels, and stow them securely on the pegs provided.
c. Raise and clamp the two outrigger feet.
d. Swing in, and secure the two outriggers.
e. Raise and clamp the two rear feet.
f. Attach the trailer towing eye to the towing vehicle and release the hand brake.
g. Raise and clamp the front foot.

The mast trailer may now be towed clear of the runway touchdown area to a position where it can be prepared for normal transit, as detailed in paras 11 and 12 after a further detachment of the trailer from the towing vehicle.

NOTES:

(1) The towing speed of the trailer while in the temporary transit condition must not exceed 10 MPH

(2) The mast NOT be towed over soft or uneven ground while it is in the temporary transit condition.

(3) Care must be taken to ensure the trailer wheels avoid protruding runway and perimeter track lights.

(4) It should never be necessary to tow the mast trailer in the temporary transit position for more than a hundred yards.

A.L.3.

ANNEX B TO
O.I.P. No 255
(Amendment No 4)

ILS GLIDE PATH AND LOCALISER BEAMS

A METHOD OF RAPID ASSESSMENT

1. A full check of the ILS Glide Path and Localiser beams is described in Part 3 of OIP 255. It takes approximately one hour to complete this check. To make a more rapid assessment of the ILS performance, which can be used, for instance, as a daily check, tests may be carried out as detailed below. The figures obtained will establish the positions of the localiser and glide path course lines, and, if required, the upper and lower edges of the glide path.

2. The main differences between this method and the full check is that the checks are carried out at one position only on the taxiway, namely at the marked position where the localiser beam crosses the runway threshold. This point is shown in Fig 6 and is marked "E" for off-set beams and "B" for in-line beams.

3. With all supplies operating correctly, and the receivers warmed up in readiness, the mast is placed in either position, "E" or "B" as appropriate, and set up as detailed in paras 4, 5, 6, of Part 2 of the O.I.P. ready for glide path tests.

4. The mast is then raised as described in Part 3, para 7, to para 11, noting when the microammeter registers zero, and holding the mast at this height.

5. Note the height on the measuring device. This corresponds to the height of the centre of the glide path beam above the runway threshold and should be within $\pm$ 4.6 feet of the figure obtained at the last satisfactory air calibration.

6. With the mast remaining at this position, change over the receiver to Localiser and set the mast height to indicate 30 feet.

7. The microammeter should now read zero $\pm$ 11 microamperes.

8. The glide path beam angle has now been checked; the Localiser beam direction has also been checked and correct alignment with the runway, or offset angle, confirmed.

9. Alternatively, the top and bottom edges of the glide path beam may also be measured. This should be done before measuring the localiser beam. The mast is raised and adjusted until the meter reads successively, 150 microamperes, zero, 150 microamperes, the height being noted at each point.

10. It is estimated that the time taken to carry out either of the above checks should not exceed fifteen minutes, thus materially reducing interferences with airfield operations.

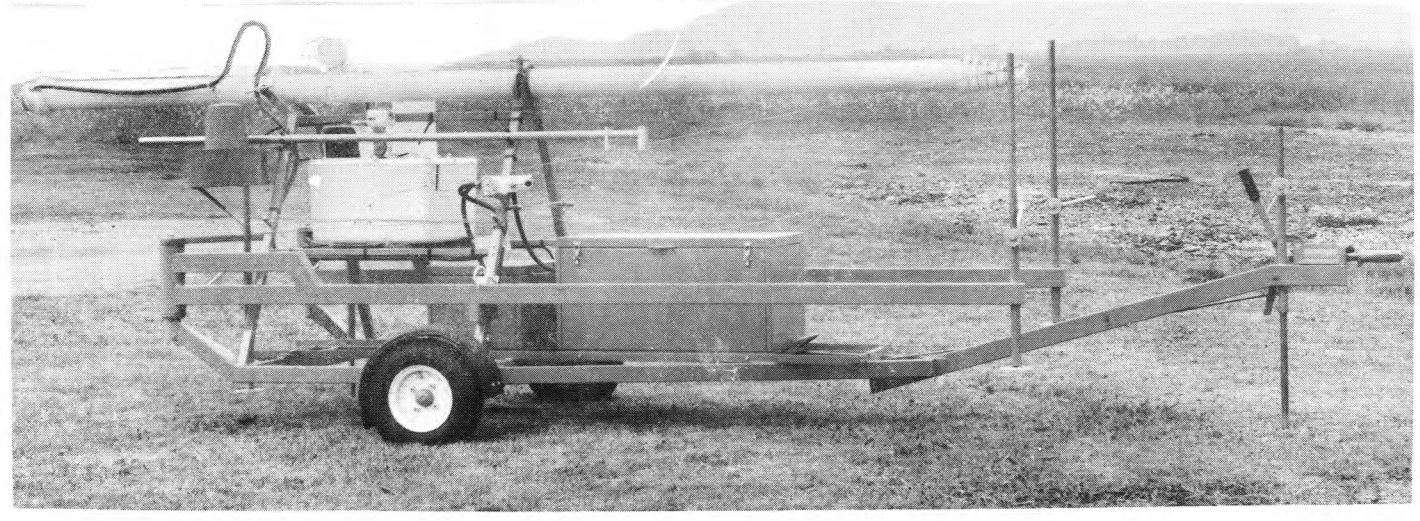


FIG. 1. TRAILER WITH MAST STOWED FOR TRANSPORT

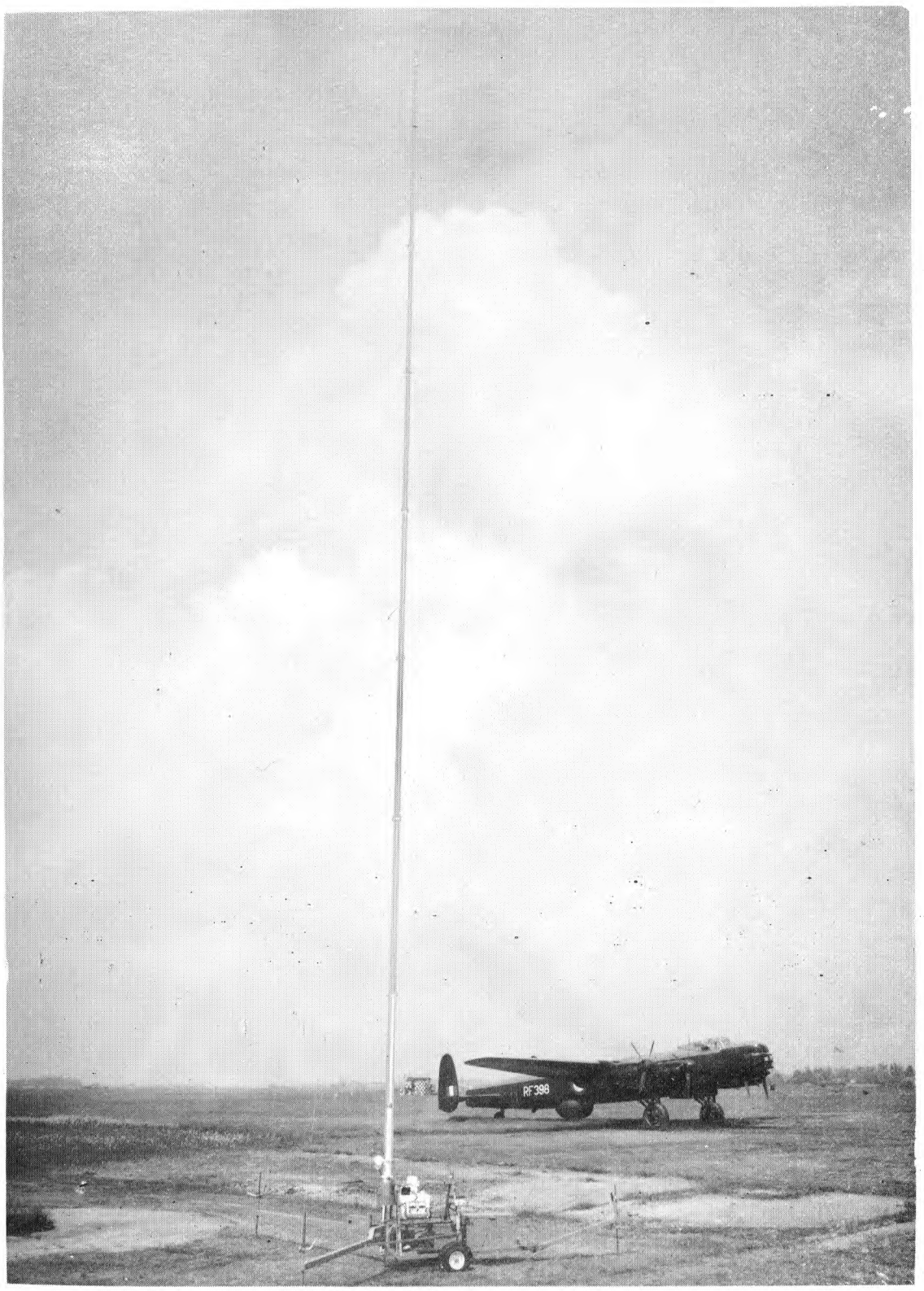


FIG. 2. TRAILER WITH MAST ERECTED

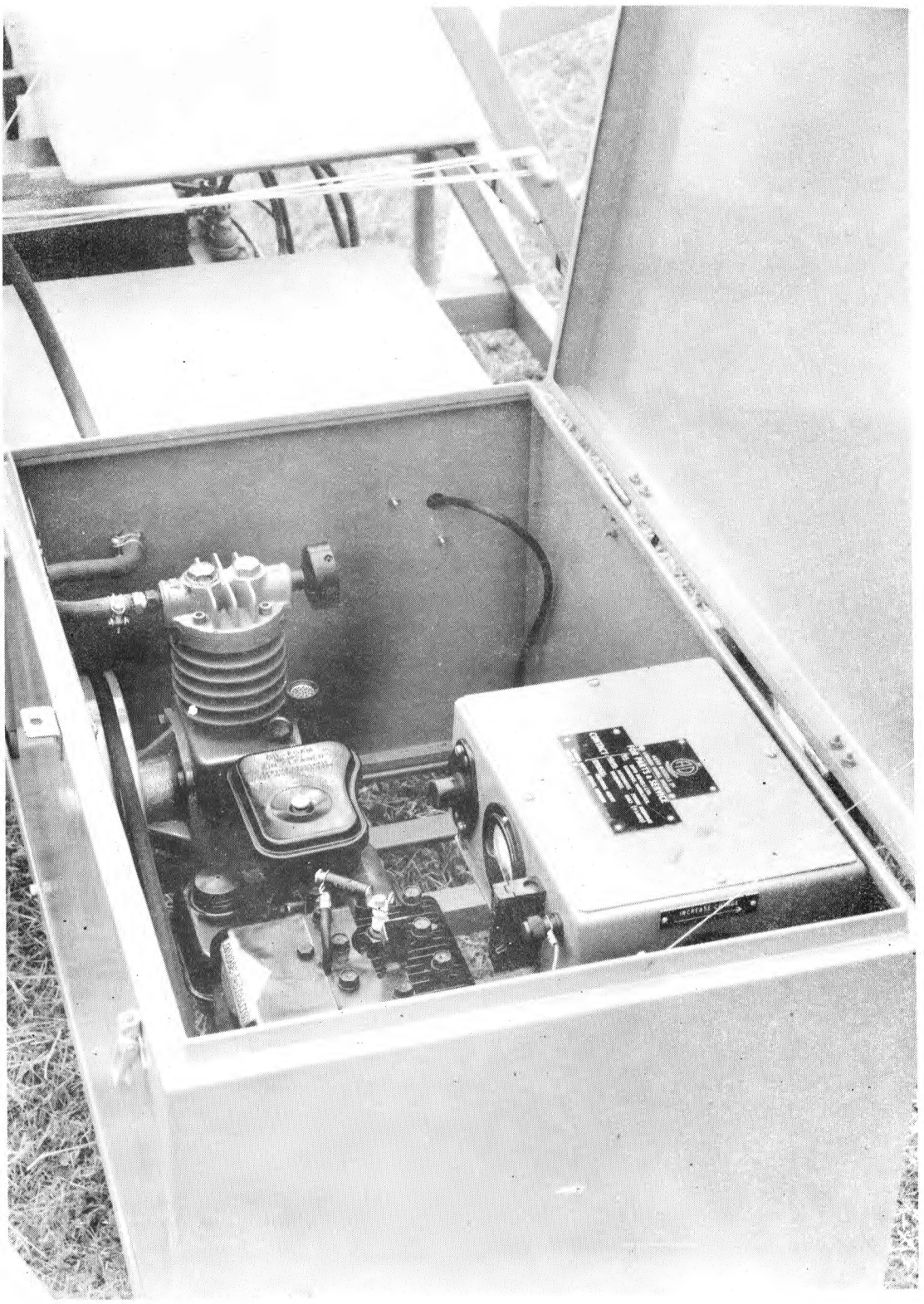
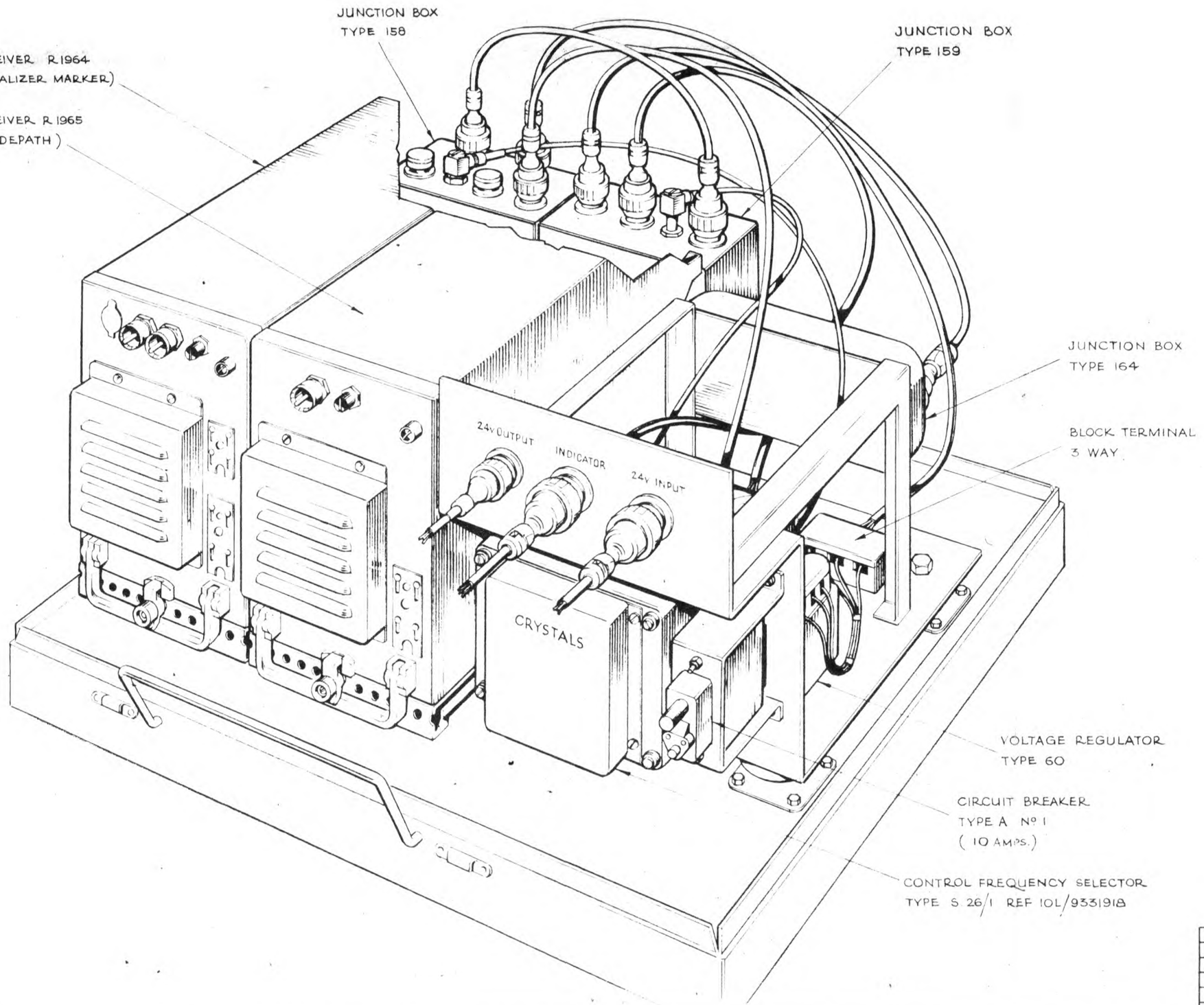


FIG. 3. POWER UNIT (INTERIOR)

DRAWING NUMBER
S. 8515



CHANGE	MOD	ISSUE	DATE
CERTIFIED	-	1	9.8.65

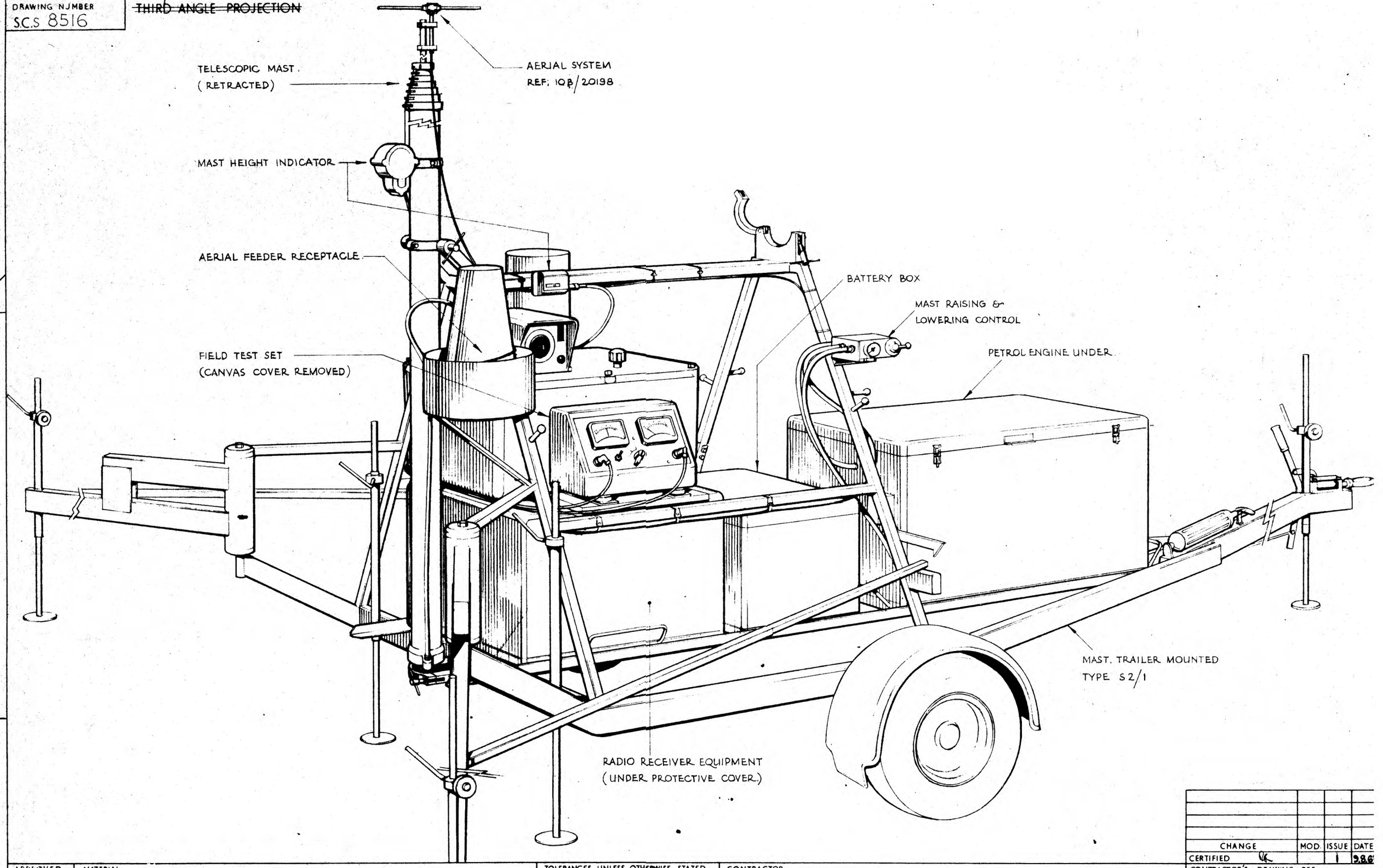
APPROVED	MATERIAL	TOLERANCES UNLESS OTHERWISE STATED DECIMAL DIMENSIONS FRACTIONAL DIMENSIONS	CONTRACTOR AIR MINISTRY H.Q. SIGNALS COMMAND R.A.F.
CHECKED			
TRACED	PROTECTIVE FINISH	DIMENSIONS IN	TITLE I. L. S. CHECKING MAST PICTORIAL VIEW OF RECEIVING EQUIPMENT (COVER REMOVED)
DRAWN H.I. Ramsell 7/8		DRAWING CLASS	
		SCALE	

CONTRACTOR'S DRAWING REF.

DRAWING NUMBER
S.C.S. 8515

DRAWING NUMBER
S.C.S 8516

~~THIRD ANGLE PROJECTION~~



CHANGE	MOD.	ISSUE	DATE
CERTIFIED		1	9.8.6

APPROVED
CHECKED
TRACED
DRAWN

MATERIAL

PROTECTIVE FINISH

TOLERANCES UNLESS OTHERWISE STATED
DECIMAL DIMENSIONS
FRACTIONAL DIMENSIONS
DIMENSIONS IN
DRAWING CLASS
SCALE

CONTRACTOR

AIR MINISTRY H.Q. SIGNALS COMMAND R.A.F.

TITLE
PICTORIAL VIEW OF I.L.S. CHECKING MAST.

CONTRACTOR'S DRAWING REF.

DRAWING NUMBER
S.C.S. 8516

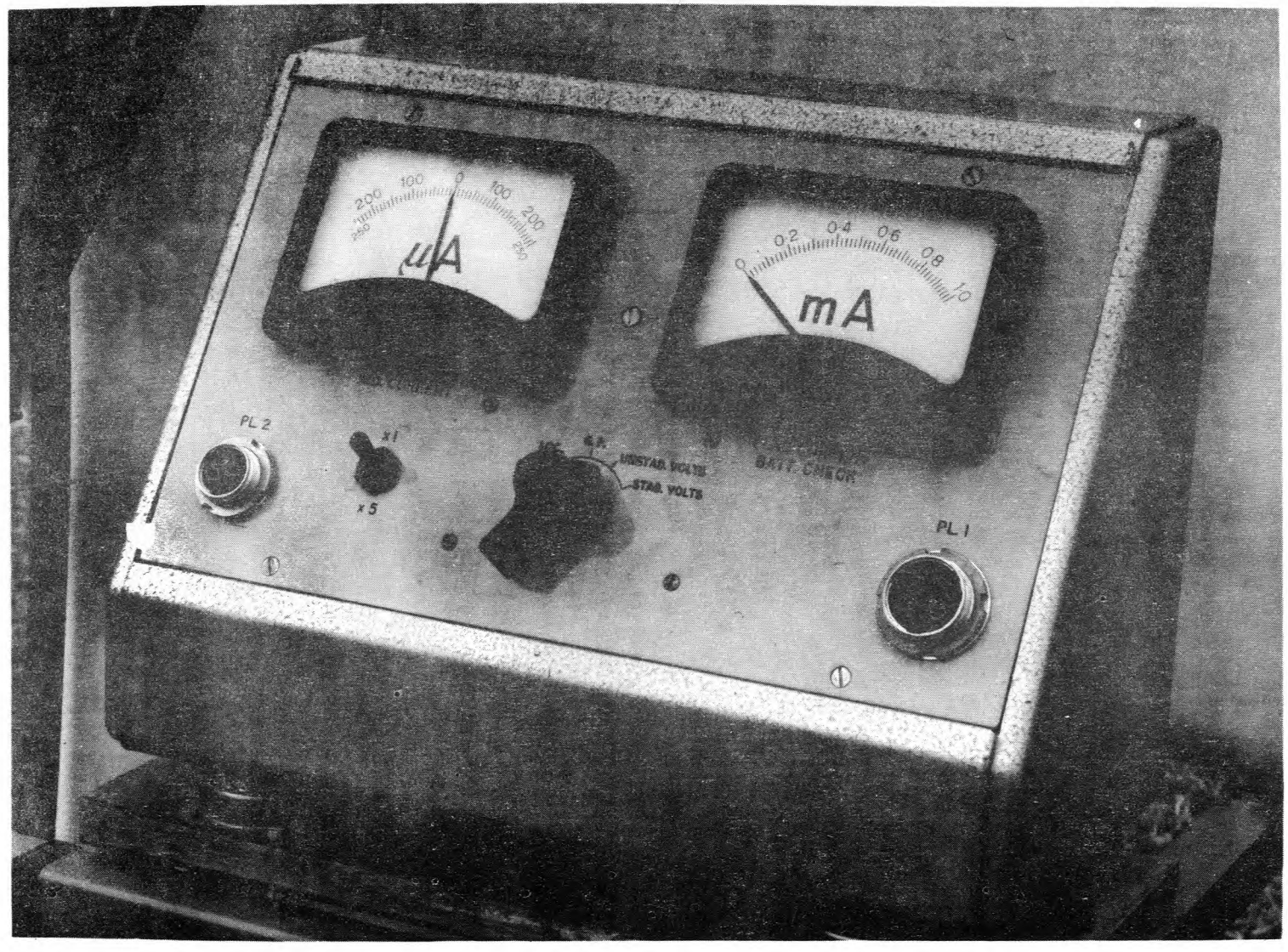
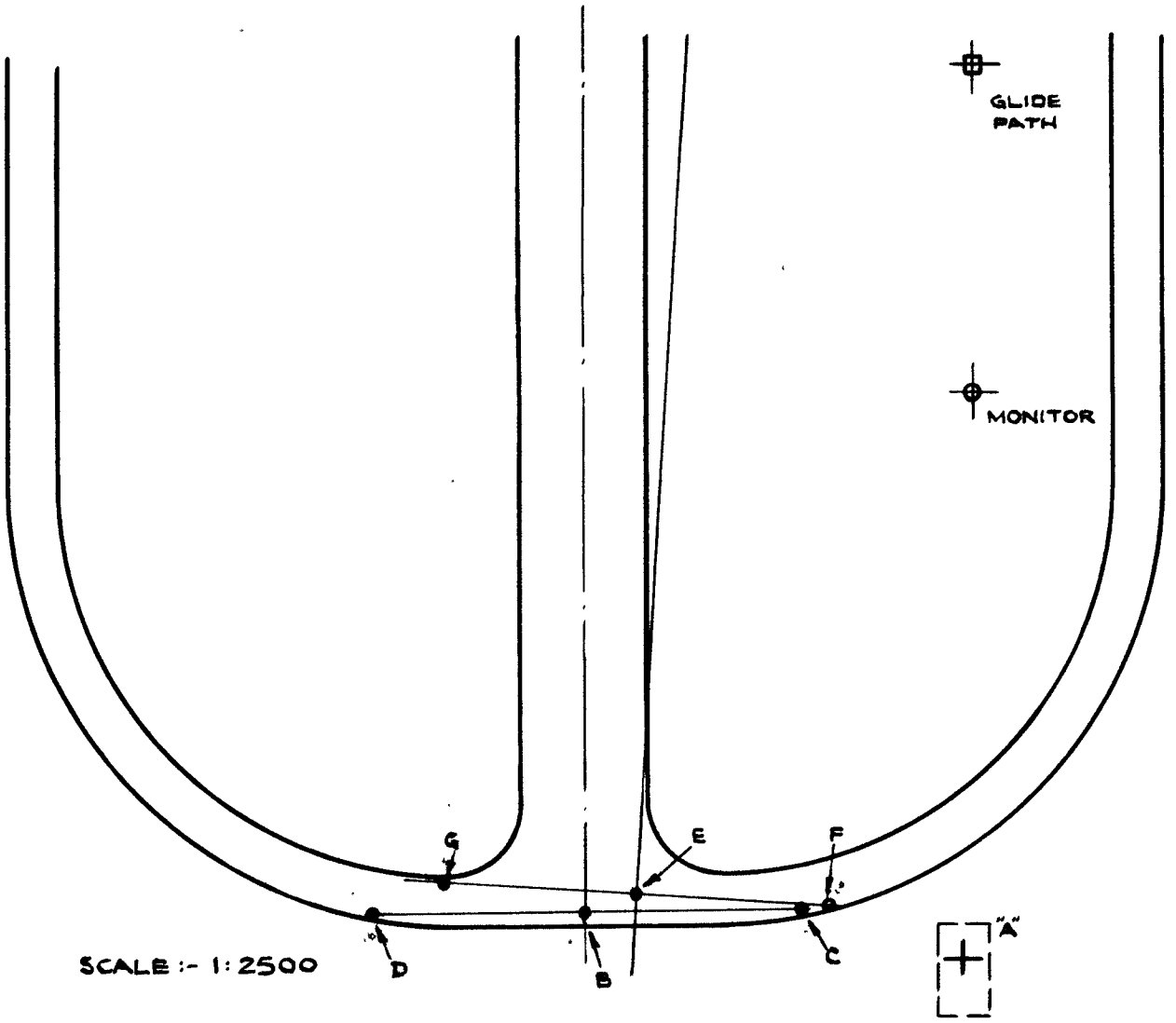


FIG. 5. FIELD TEST SET

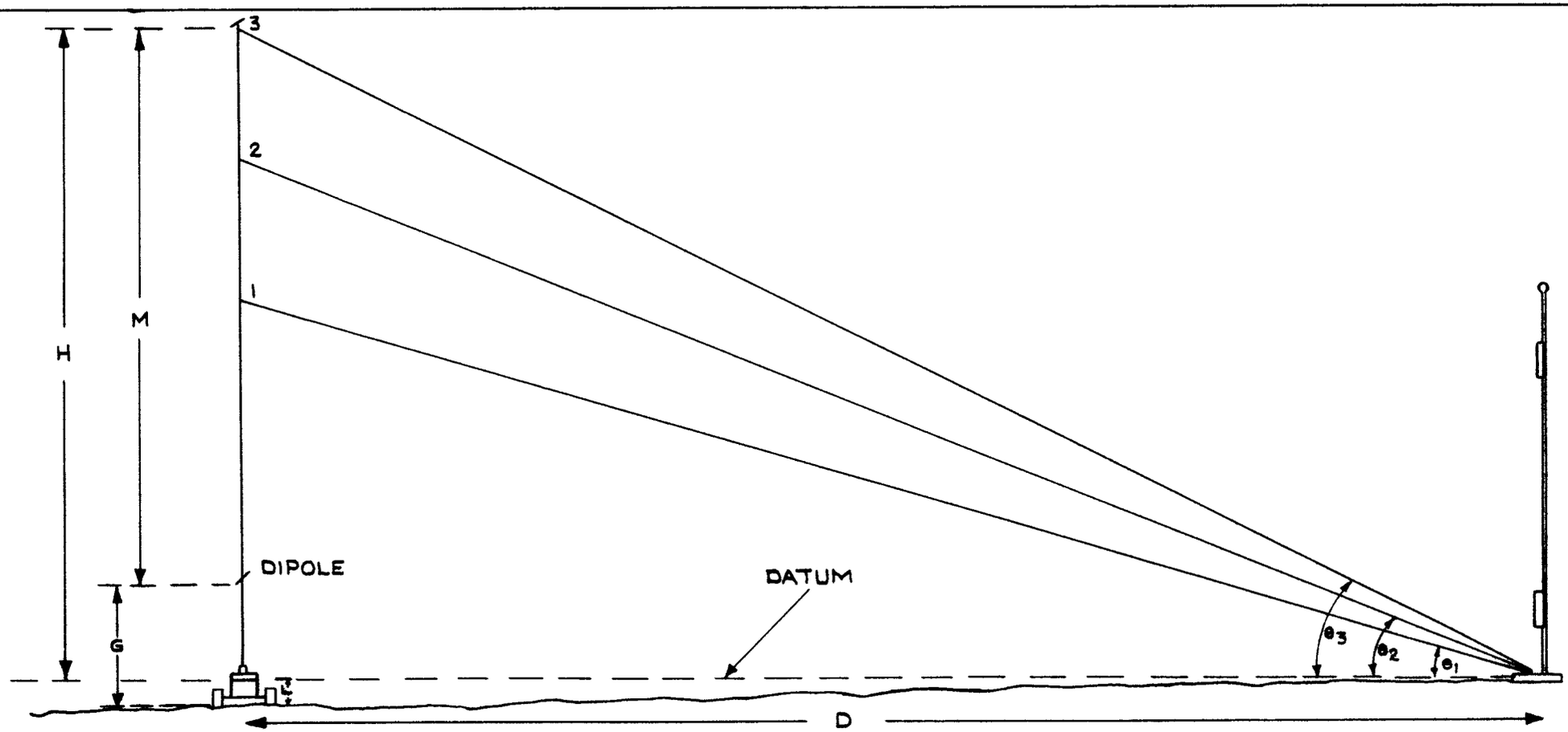


NOTES:-

1. "A" IS A WOODEN PEG SET IN CONCRETE ON THE GRASS VERGE OR ON A CONCRETE PLINTH LARGE ENOUGH TO TAKE THE TRAILER FOR GLIDE PATH MEASUREMENTS.
2. "B", "C", AND "D" ARE MARKS PAINTED ON THE TAXIWAY TO INDICATE THE CENTRE OF THE LOCALISER BEAM, ALSO THE TWO EDGES IN THE CASE OF AN "IN-LINE" LOCALISER SITE.
3. "E" "F" AND "G" ARE SIMILAR MARKS ON THE TAXIWAY WHEN THE LOCALISER BEAM IS "OFF-SET"
4. IN ALL CASES THE BASE OF THE MEASURING MAST WHEN ERECTED LIES OVER THE MARK.
5. THE OFF-SET ANGLE MAY BE EITHER SIDE OF THE CENTRE LINE.

FIG. 6

DIAGRAM OF RUNWAY MARKINGS FOR POSITIONING THE MAST.



G IS THE HEIGHT OF THE DIPOLE ABOVE THE GROUND WITH THE MAST RETRACTED AND THE HEIGHT INDICATOR READING "0"

L IS THE DIFFERENCE IN LEVEL BETWEEN THE BASE OF THE AERIAL AND THE GROUND ON WHICH THE TRAILER STANDS MAY BE + OR −.

M IS THE NUMBER OF FEET AND TENTHS MEASURED ON THE HEIGHT INDICATOR AT POINTS 1, 2 AND 3.

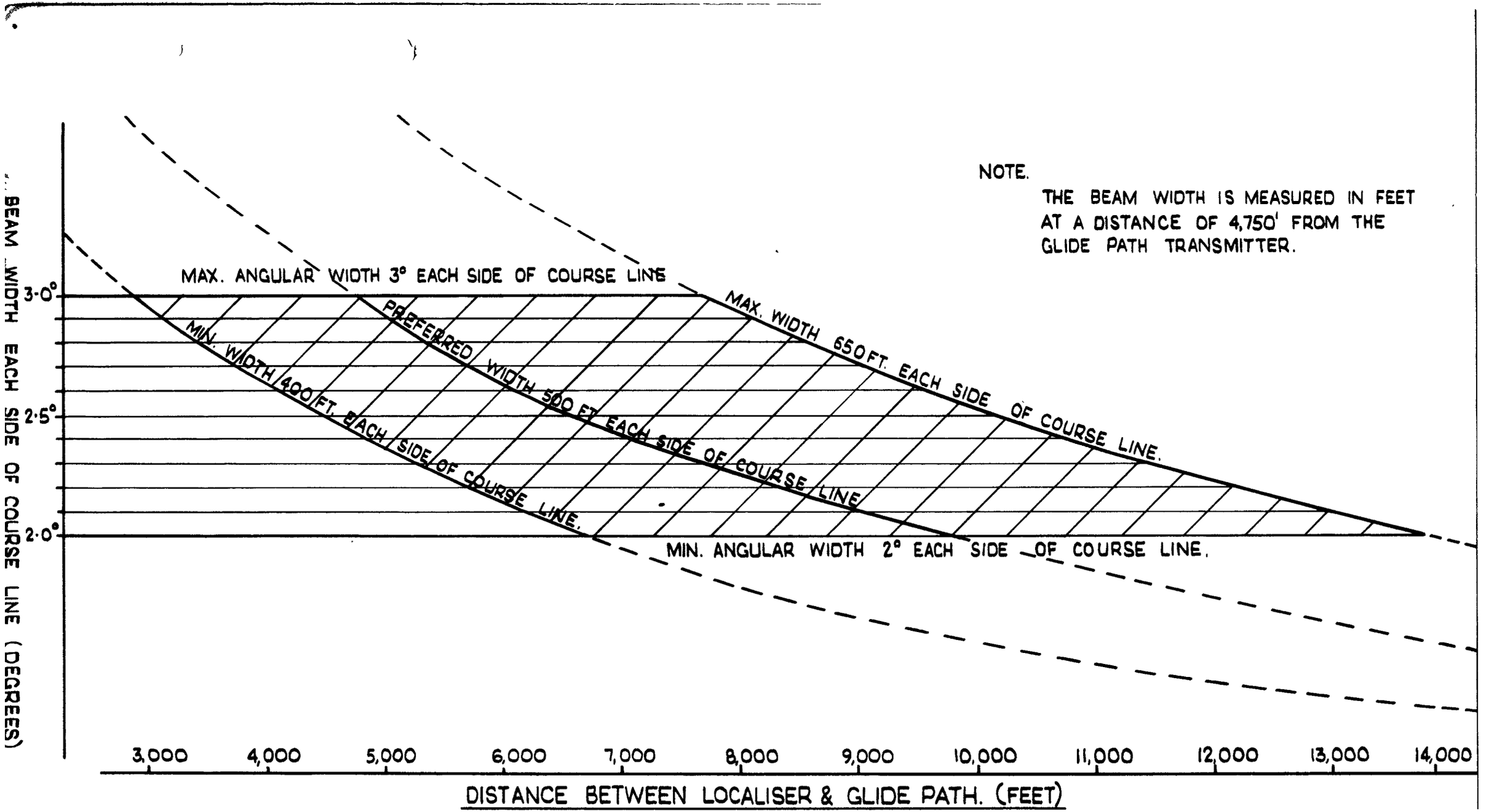
H IS DERIVED FROM M+G+L ON HIGH SITES OR M+G−L ON LOW SITES. IT IS M+G ON LEVEL SITES.

D IS A STANDARD DISTANCE OF THE ORDER OF 1000 FEET AND IS CONSTANT FOR ANY PARTICULAR AIRFIELD

$\theta_1, \theta_2, \theta_3$, THESE ANGLES ARE OBTAINED FROM $\frac{H}{D} = \tan\theta$

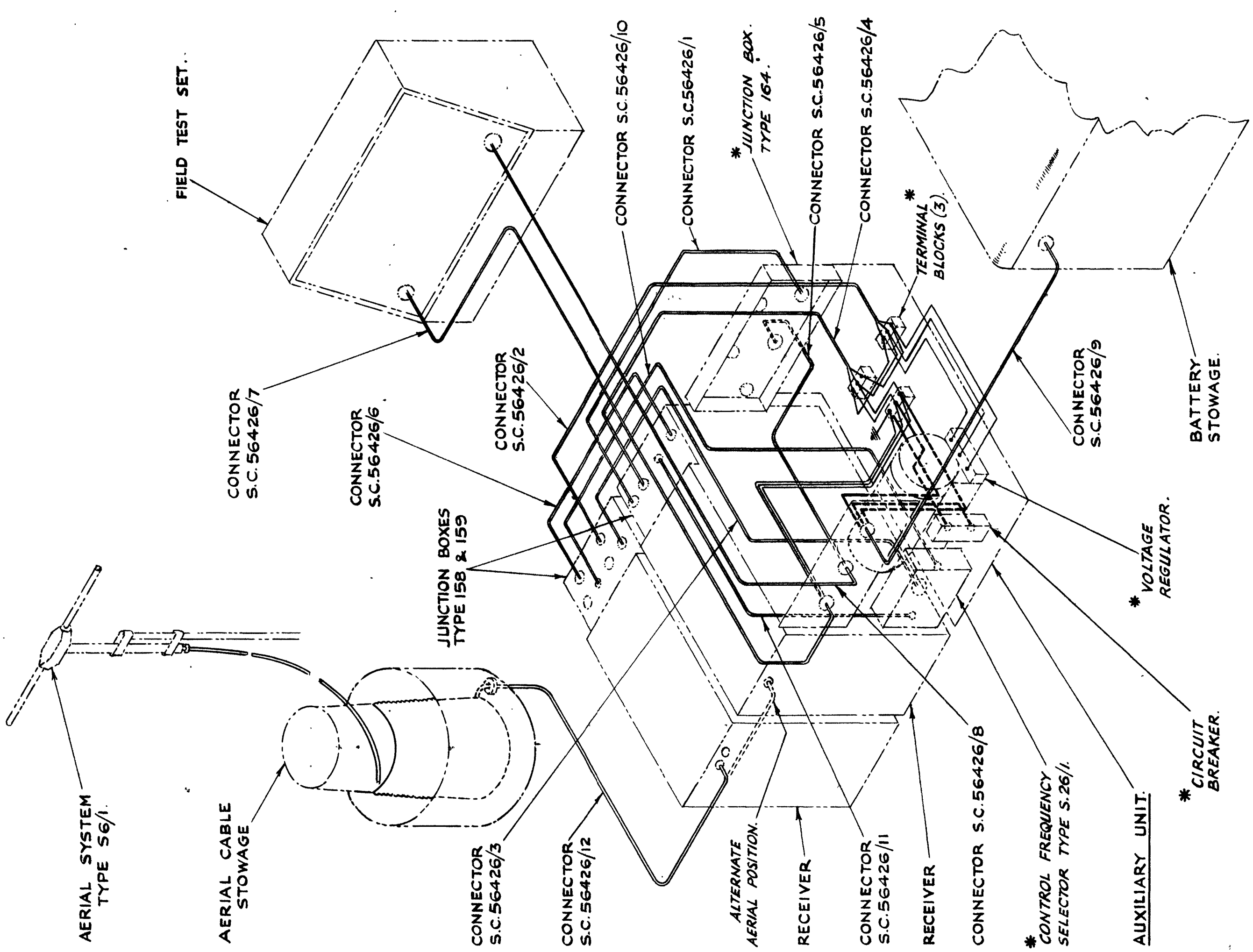
POINT 1 IS THE LOWER EDGE (150 μA) POINT 2 IS THE BEAM CENTRE (0 μA) POINT 3 IS THE UPPER EDGE (150 μA)

FIG. 7. GLIDE - PATH MEASUREMENT.



LOCALISER BEAM - WIDTH CHART.

FIG. 8.



TRACED	
DRAWN	

I.L.S. CHECKING MAST CONNECTOR LAYOUT.

ISSUED BY
AIR MINISTRY
H.Q. SIGNALS COMMAND
R.A.F

DRAWING NUMBER
S.C. 57652

TO CONTROL FREQUENCY SELECTOR

FROM GLIDEPATH RECEIVER

JUNCTION BOX TYPE 159

11P5 — 11P3 — 11P1

GP SIGNAL — 510 — 1K

GP FLAG — 390 — 390

+200V — +19V — +24V

MARKER LAMP

11P2 — 11J4

13P1 — 13P2 — 13P3 — 13P4 — 13P5

JUNCTION BOX TYPE 164

FIELD TEST SET

C1 1000 — M1 — M2 — R1 820 — R5 820 — SW1 — R4 240

SW2A — SW2B — SW2C

RL1 4 — RL1 2 — RL1 3 — RL1 1 — RL2 3 — RL2 1

R2 390 5% — R6 390 5% — R3 1K 2% — R7 1K 2%

PL1 — PL2

AUXILIARY UNIT

NEG — +19V — +24V

OPERATING COIL — BALLAST RESISTOR — DIVERTER RESISTOR

FROM BATTERY BOX

FROM LOCALISER RECEIVER

6P5 — 6P4 — 6J1 — 6P6 — 6P2 — 6P7 — 6J3

8C1 4M

LOC. FLAG — 390 — 390 — 510 — 1K

LOC. SIGNAL

JUNCTION BOX TYPE 158

TO J.B. 159

CONTROL FREQUENCY SELECTOR

1ST LOCAL OSC. LOCALISER RECEIVER

1ST LOCAL OSC GLIDEPATH RECEIVER

C1 ·001 — R1 4·7K — C7 ·001 — R7 4·7K — C8 ·001

R3 22K — R9 22K — C4 ·001 — C10 ·001

C5 33P — C6 56P — C3 ·01 — R2 43 — R4 100 — R6 22K — R5 1·5K

CV1 1·5-20P — CV2 1·5-20P — XL1 — XL2

LP1 — C13 ·01 — L1

PL1 — PL2 — SK1

TOLERANCES UNLESS OTHERWISE STATED
DECIMAL DIMENSIONS
FRACTIONAL DIMENSIONS

MATERIAL
PROTECTIVE FINISH

APPROVED
CHECKED
TRACED

CONTRACTOR

TITLE

AIR MINISTRY H.Q. SIGNALS COMMAND R.A.F.

EQUIPMENT — OVERALL CIRCUIT DIAGRAM

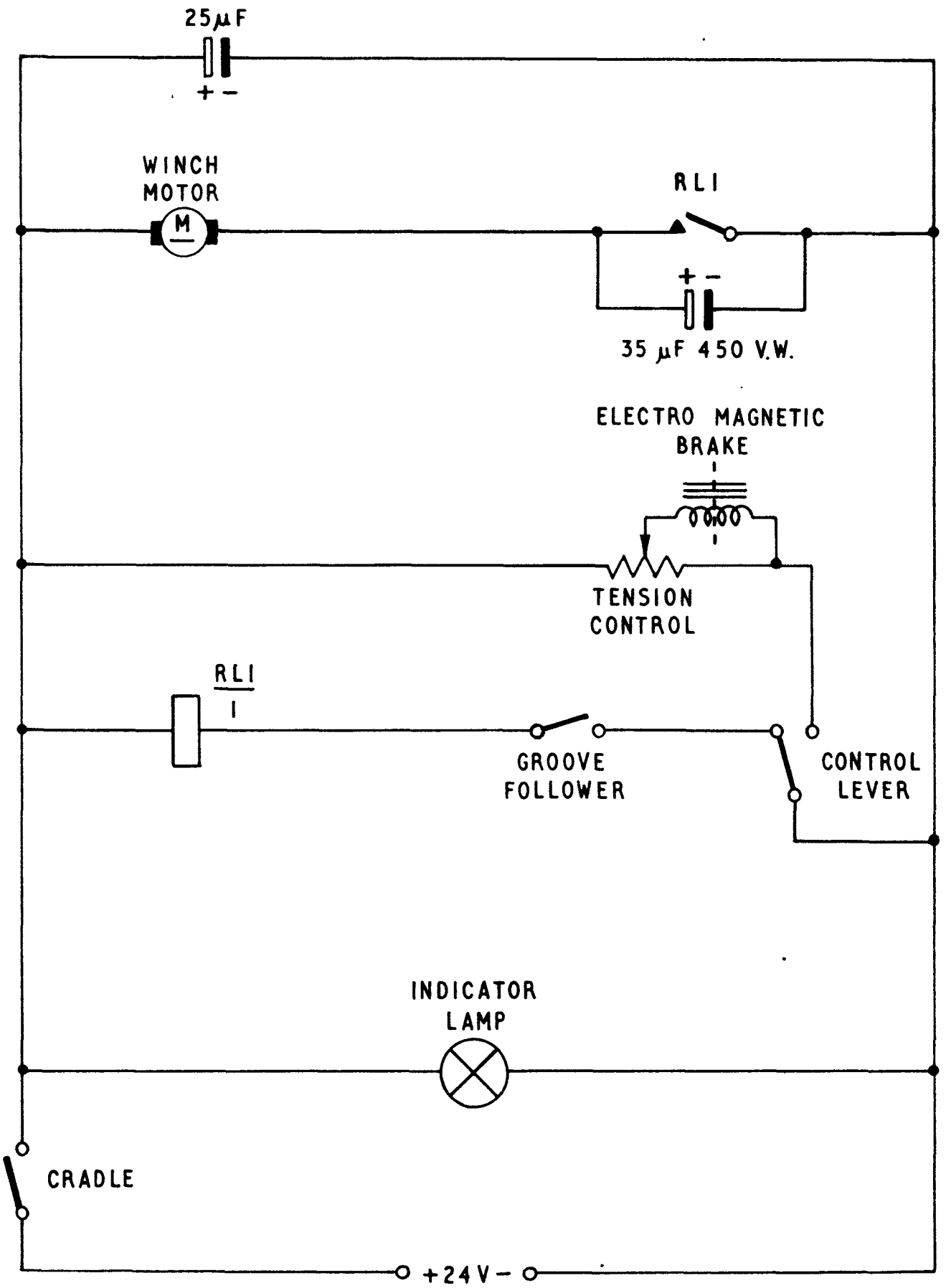
CERTIFIED CONTRACTOR'S DRAWING REF.

CHANGE — MOD. NUMBER — DATE

USED ON

DRAWING NUMBER
S.C.A 67193

THIRD ANGLE PROJECTION



MATERIAL				
PROTECTIVE FINISH				
	CHANGE	MOD	ISSUE	DATE
	CERTIFIED			
DIMENSIONS IN	TOLERANCES UNLESS OTHERWISE STATED DECIMAL DIMENSIONS FRACTIONAL DIMENSIONS			
SCALE				

APPROVED	CONTRACTOR	SECURITY CLASSIFICATION
CHECKED	H.Q. SIGNALS COMMAND R.A.F.	CONTRACTOR'S DRAWING No.
TRACED B. Garrard.	TITLE I.L.S. CHECKING MAST ELECTRICAL CIRCUIT.	DRAWING NUMBER S.C.A 67193
DRAWN		

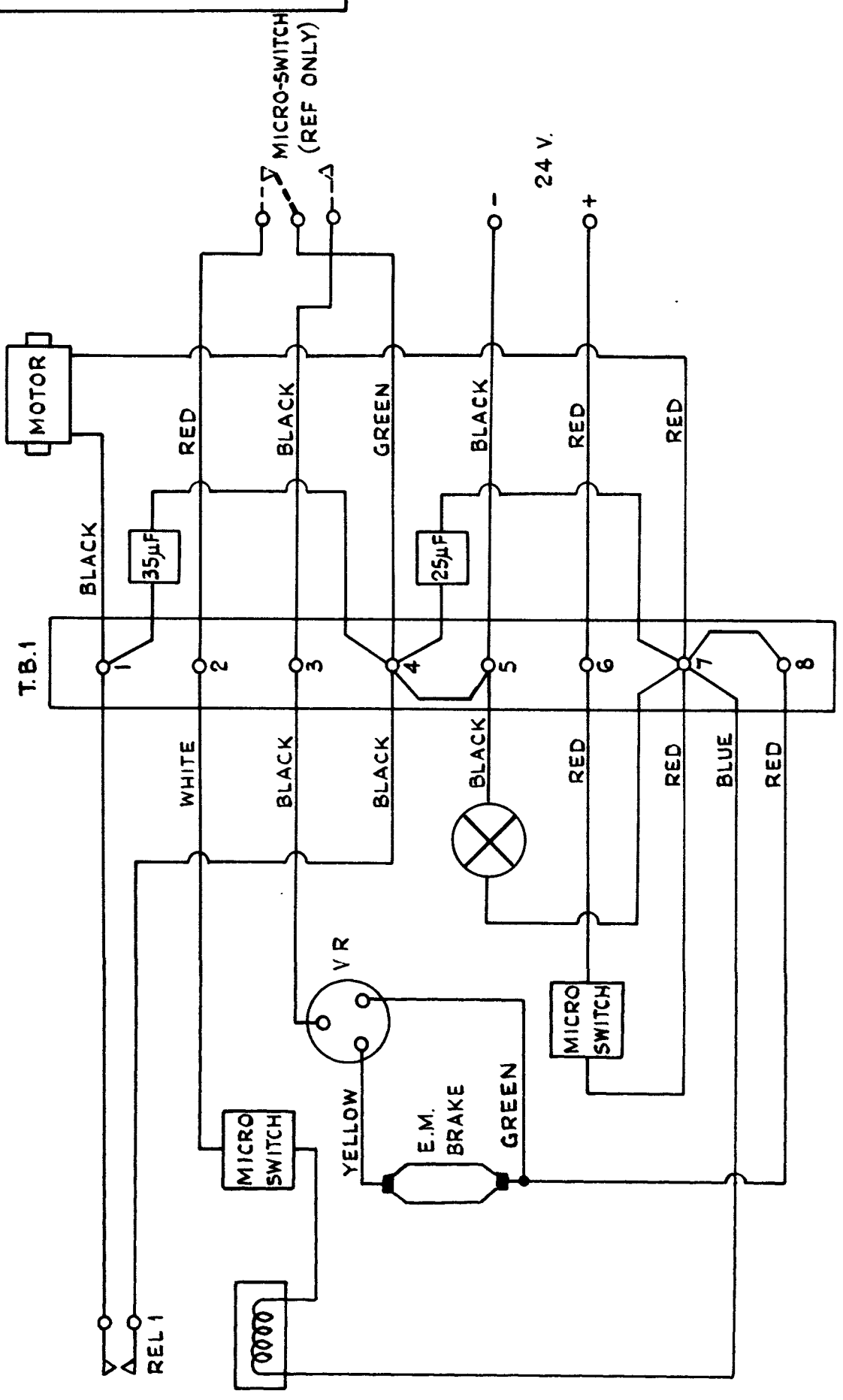
1236.16937B.Et.12.65

15" x 10" SIZE A

USED ON

DRAWING NUMBER
S.C.A 67194

THIRD ANGLE PROJECTION



NOTE:-
MOTOR TO ROTATE ANTI CLOCKWISE WHEN VIEWED FROM SHAFT END.

MATERIAL				
PROTECTIVE FINISH				
	CHANGE	MOD	ISSUE	DATE
	CERTIFIED			
DIMENSIONS IN	TOLERANCES UNLESS OTHERWISE STATED			
SCALE	DECIMAL DIMENSIONS FRACTIONAL DIMENSIONS			

APPROVED	CONTRACTOR	SECURITY CLASSIFICATION
CHECKED	H.Q. SIGNALS COMMAND R.A.F.	CONTRACTOR'S DRAWING No.
TRACED B. Garrard.	TITLE I.L.S. CHECKING MAST ELECTRICAL CONNECTIONS	DRAWING NUMBER S.C.A 67194
DRAWN		

15"x10" SIZE A

1236.1/9378.ET./2.65

OPERATIONAL INSTRUCTION PAMPHLET No 255

AL 3 This amendment must be read and actioned in conjunction with part 3 "operations and use" page 5.

AL 4 Page 2, part 2, para 2, delete the first sentence and substitute:- "The guy winch is operated by an electric motor powered by the battery."

AL 5 Page 3, part 2, para 11, delete in toto and substitute:- "An extension tube, fitted to the uppermost section of the mast carries the dipole aerial. The signal collected by this dipole is transmitted to the receiving apparatus by means of a coaxial feeler (Duradio 68) suitably guided down the side of the mast and accommodated on a conical bollard."

AL 6 Page 8, part 3, para 17, delete all sentences following 'refer to fig 7' and substitute:-
"Example:- G

The height of the dipole above the ground is found to be 19.7 feet and the ground is 2 feet lower than datum.

The height M shown on the indicator is 34.9 feet at position 2 (beam centre).

The true height H, is therefore 19.7 feet minus two feet plus 34.9 feet which totals 52.6 feet.

The distance of the mast from the aerial base is 1000 feet. D

The angle required is given by $\frac{H}{D} = \tan \theta$ (2) .

ie $\frac{52.6}{1000} = .0526$

from the tangent tables .0526 = 3.01°."

AL 7 Remove and destroy existing Fig 7 and replace with revised Fig 7 herewith.

OPERATIONAL INSTRUCTIONS FOR ILS BEAM CHECKING USING THE TELESCOPIC MAST

It is essential to check the following requirements before attempting to make ILS beam checks with the telescopic mast.

1. Clearance has been given to proceed on to the instrument approach end of the runway by the station SATCO.

2. The airborne receivers to be used on the mast trailer are serviceable and have been satisfactorily calibrated.

3. The correct value of crystals are available for satisfactory reception of localiser and glide path signals of the installation to be checked. The values of these crystals may be calculated using the following formulae.

a. $fxtal = \frac{(fl - 28.6)}{8} \times 1000$

where fxtal = localiser crystal frequency in Kc/s
fl = localiser beacon frequency in Mc/s

b. $fxtal = \frac{(fg - 54)}{18} \times 1000$

where fxtal = glide path frequency in Kc/s
fg = glide path beacon frequency in Kc/s

4. Fit the receivers to the auxiliary unit and secure them tightly, checking that the load screws on JB 159 are in the correct positions, ie 1 Indicator, 1 Flag.

5. Fit the appropriate crystals in the control frequency selector and replace the retaining cover plate.

6. Fit the weatherproof cover to the auxiliary unit.

7. Position the auxiliary unit on to the trailer behind the battery box, and secure it by the two locking screws.

8. Fit the field test set to the trailer beside the winch drum and lock it in position with the two channel taper pins.

9. Expose the cable sockets on the auxiliary unit by lifting the cover flap, then:

a. Fit the connecting cables (2) between the auxiliary unit and field test set, such that they will not interfere with the use of the guy ropes.

b. Fit the appropriate connector between the battery box and the auxiliary unit.

c. Fit the cable between the cabin and the localiser receiver (assuming the localiser beam will be checked firstly.)

10. Check the batteries are fully charged and secured in position.

11. Check adequate fuel is in the petrol tank.

12. Secure the towing eye of the trailer to the towing vehicle ensuring the hand brake is released.

13. Before towing commences a check should be made to ensure that all trailer feet are secured in the "up" position.

The mast may now be towed to one of the checking points marked on the runway or perimeter track in accordance with OIP 255 fig 6.

14. Tow the trailer to one of the pre determined crosses on the runway, lower and secure the front trailer foot.

15. Disconnect the trailer from the towing vehicle and manoeuvre it such that:

a. The mast base clamp is directly over the runway marking.

b. One guy rope will face directly into the wind.

16. When para's 15a and 15b have been satisfied apply the trailer hand brake.

17. Adjust the front foot height until the mast barrel is horizontal with the ground, and lock it in this position.

18. Let down the rear two trailer feet and lock them.

19. Remove the transit safety rod from the two outrigger feet.

20. Raise the outrigger retaining catches and swing the arms out to their limit.

21. Drop the outrigger feet and lock them in position.

22. Remove the dipole section of the mast from the transit position, and insert it in the apperture at the mast barrel head after the removal of the cross bolt.

23. Replace the crossbolt and align the dipole if necessary so that when the mast is raised to the vertical position the dipole will face the transmitting aerial of the facility under test.

24. Unwind a few turns from the end of the duradio 68 feeder cable from the conical bollard, feed it through the guide loops, and plug the cable end into the dipole socket.

25. Ensure the weight of the feeder cable will not be placed on the dipole socket when the mast is vertical; adjust the distance clamp if necessary.

26. Open the saddle clamp.

27. Extend the height indicator wire from its winch drum to the peg on the top most section of the mast, feeding the wire through the guide loops.

28. Slacken the clamp bolts at the mast pivot point.

29. Untie the guy ropes and leave them slack.

30. Ensure the duradio 68 feeder cable is slack, and not caught beneath any protrusions.

31. Open the mast base clamp (adjacent to the auxiliary unit).

32. Raise the mast from the horizontal to the vertical position and lock it by securing the base clamp.

Notes a. This operation should be carried out by two persons, one either side of the pivot point.

b. As the mast barrel is raised from the horizontal position a red indicator lamp on the winch drum control panel should light up, indicating the electrical supply to the winch motor is available. Failure of the lamp to light up should be investigated immediately.

33. Tighten the locking bolts at the pivot point.

34. Pass the three guy ropes over the appropriate three pulley wheels.

35. Check the charging rate potentiometer is in the "max" clockwise position.

36. Temporarily earth the sparking plug of the petrol set, and move the compressor off the compression stroke by turning the drive belt. Remove the earthing strap from the sparking plug.

37. Pull out the choke control on the petrol set.

38. Ensure the airflow control lever is in the "down" or the "hold" position.

39. Press the electrical start button of the petrol set, when the engine fires, replace the choke to the running position. Should the engine fail to start through poor battery capacity the hand recoil starter should be used.

40. With the petrol set running, adjust the charging rate potentiometer for current of 5 to 10 amps.

41. Press the 24 volt supply button on the auxiliary unit, the red indicator lamp on the control frequency selector should light up.

42. Check the stabilized 19V, and the unstabilized 24 Volt supplies on the field test set, finally set the selector switch to the facility under test.

43. Set the height indicator to zero feet.

44. Release the winch drum brake by turning the knob fully anti clockwise.

45. Put the control lever in the "up" position; the mast will immediately commence to extend so that care must be taken to ensure the feeder cable unwinds smoothly from the conical bollard.

46. The potentiometer control on the winch drum control panel will now adjust the tension on the guy ropes.

47. Raise the mast to the predetermined height and put the control lever in the "hold" position.

48. Observe and note the flag and micro ammeter readings on the field test set.

49. Repeat paras. 46 and 47 as necessary.

50. Select the "down" position for the control lever, immediately the mast will lower. During this time the feeder cable should again be coiled into the conical bollard.

51. When the height indicator shows zero feet again the mast is fully deflated. the petrol set may now be stopped by earthing the sparking plug.

52. Press the 24 Volt circuit breaker on the auxiliary unit, to remove the 24V supply.

53. Detach the guyropes from the pulley wheels leaving them unsecured.

54. Lock the winch drum by turning the brake knob fully clockwise.

55. Slacken the locking bolt at the pivot point and unfasten the securing collar at the mast base.

56. Again with two persons, (one either side of the pivot point) gently lower the mast into the horizontal position.

Note a. Ensure a slack unrestricted feeder cable during the lowering operation.

b. Guard against crushing the feeder cable in the cradle.

57. Disconnect the feeder cable from the dipole socket and stow in the conical bollard.

58. Disconnect the height indicator wire from the mast head, and attach it to the drum housing.

59. Close and fasten the mast cradle clamp.

60. Remove the dipole assembly cross bolt and transfer the dipole assembly to the transmit position, clamping it tightly in position.

61. Raise and clamp the outrigger feet.

62. Swing in the outriggers and replace the outrigger safety rod.

63. Stow the guy ropes around the pegs on the trailer frame provided.

64. Raise and clamp the rear two [illegible]

65. Attach the trailer towing eye to the towing vehicle and release the hand brake.

66. Raise and clamp the front foot.

67. The mast may now be towed away.

If there is an urgent air traffic requirement for the mast trailer to be cleared from the runway touchdown vicinity while beam checks are being made, and the mast is fully or partially extended; the following temporary transit procedure may be adopted:

a. Select the down position for the control lever, immediately the mast will lower. During this time the feeder cables should again be coiled into the conical bollard, until the height indicator reads zero.

b. Detach the two guy ropes from the outrigger pulley wheels, and stow them securely on the pegs provided.

c. Raise and clamp the two outrigger feet.

d. Swing in, and secure the two outriggers.

e. Raise and clamp the rear two feet.

f. Attach the trailer towing eye to the towing vehicle and release the hand brake.

g. Raise and clamp the front foot.

The mast trailer may now be towed clear of the runway touchdown area to a position where it can be prepared for normal transit, as detailed in paras 42 and 65 after a further detachment of the trailer from the towing vehicle.

NOTES

(I) The towing speed of the trailer while in the temporary transit condition must not exceed 10 MPH.

(II) The mast must not be towed over soft or uneven ground while it is in the temporary transit condition.

(III) Care must be taken to ensure the trailer wheels avoid protruding runway and perimeter track lights.

(IV) It should never be necessary to tow the mast trailer in the temporary transit position for more than a few hundred yards.

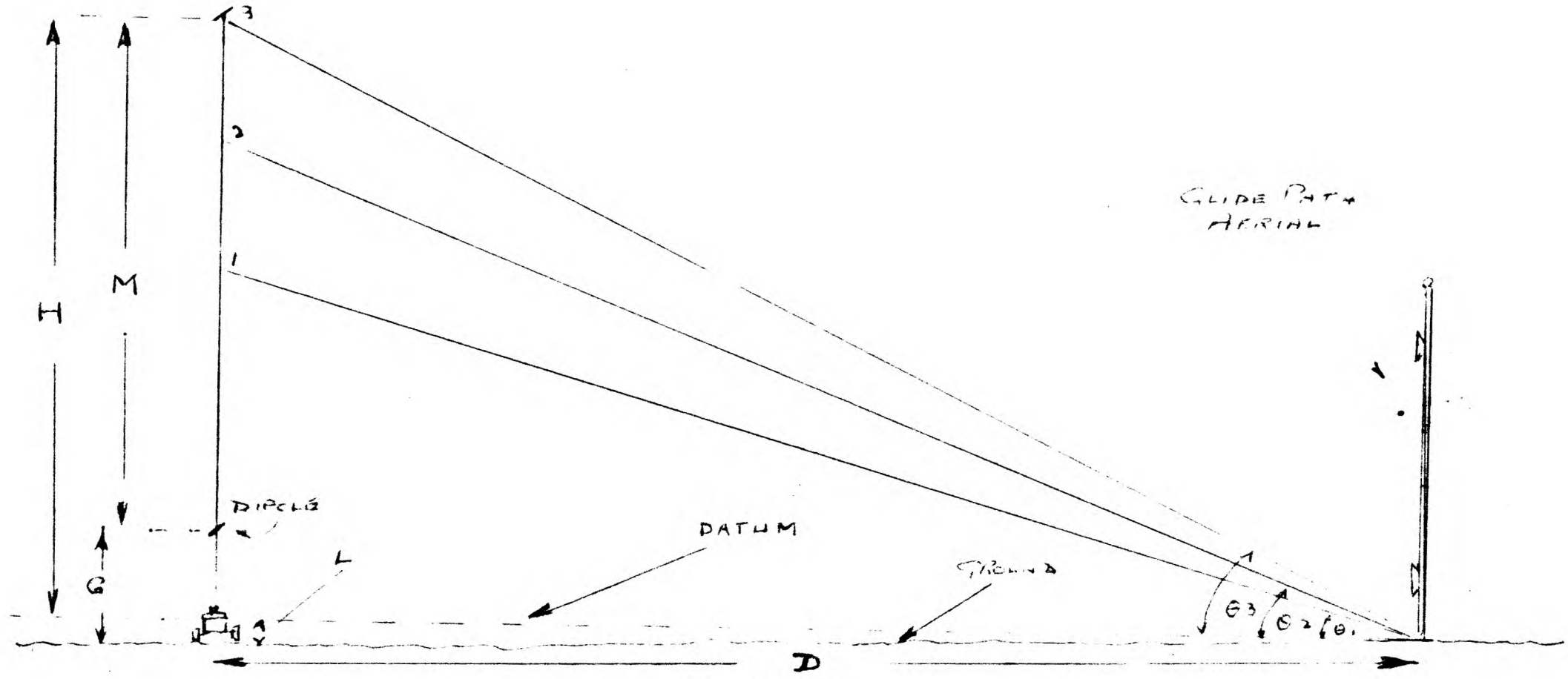


FIG. 7.

I.L.S. GLIDE PATH MEASUREMENT

HEADQUARTERS SIGNALS COMMAND
OPERATIONAL INSTRUCTION PAMPHLET NO. 255
INTRODUCTION OF I.L.S. CHECKING MAST
(MAST, TRAILER-MOUNTED, TYPE S.2/1)

AMENDMENT NO. 5

1. Unlace the O.I.P. Insert two drawings.

SC: A.67193,
SC: A.67194,

AL.5.

Relace the O.I.P.

---

2. Cover Page, Illustrations

Below last entry, cut out and insert,

ILS Checking Mast, Electrical Circuit (Trailer) Drg.No.SC:A.67193.
ILS Checking Mast, Electrical Connections (Trailer) Drg.No.SC:A.67194

AL.5.

---

3. After incorporation, complete the Amendment Record on the back of the front cover.

18 July, 1966.

Headquarters Signals Command

Distribution

MOD Elect Eng 19 (RAF)
MOD Elect Eng 3 (RAF)
MOA Tels 5
HQ BC
HQ FC
HQ TC
HQ CC
HQ FTC
HQ RAF Germany
HQ TTC
OC TCF Henlow
RTPS North Luffenham
RAF Locking
RAF Leuchars
RAF Watton (No 115 Sqdn)
RAF Wittering
MOA Tels E4A
ATP 21 RAE Farnborough
BLEU RAE MOA Bedford.

Internal

Des ATC 1
Des ATC 1b
Des Afd Inst.
Des CR 1b
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HEADQUARTERS SIGNALS COMMAND
OPERATIONAL INSTRUCTION PAMPHLET NO. 255
INTRODUCTION OF I.L.S. CHECKING MAST
(MAST, TRAILER-MOUNTED, TYPE S.2/1)

AMENDMENT NO 4

1. Unlace the O.I.P. Insert Appendix B after Annex A. Relace the O.I.P.

2. Cover Page. Contents

Below - Preparation for Transit,
Cut out and insert

Annex A. Operating Instructions for ILS Beam Checking Using the Telescopic Mast Type S.2/1.
Annex B. ILS Glide Path and Localiser Beams. A method of Rapid Assessment.

AL4.

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3. On incorporation, complete the Amendment Record on the back of the front cover.

January 1966

Headquarters Signals Command.

Distribution

MOD Elect Eng 19 (RAF)
MOD Elect Eng 3 (RAF)
MOA Tels 5
HQ BC
HQ TC
HQ CC
HQ FTC
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RTPS North Luffenham
RAF Locking
RAF Leuchars
RAF Watton (No 115 Sqdn)
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HEADQUARTERS SIGNALS COMMAND

OPERATIONAL INSTRUCTION PAMPHLET NO. 255

INTRODUCTION OF I.L.S. CHECKING MAST

(MAST, TRAILER-MOUNTED, TYPE S.2/1)

AMENDMENT NO 3

1. Page 2, Part 2, para. 2. Delete in toto.

Cut out and insert new para. 2.

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2. The guy winch is operated by an electric motor powered by the battery. The air-compressor is belt-driven from the petrol-engine. The direct-coupled generator of the petrol-electric set supplies charging current to the battery and, for starting, the generator can be motored by the batteries to start the petrol engine. The battery may be used floating across the generator, or not, as desired.

A.L.3

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2. Page 3, Part 2, para. 11. Delete in toto.

Cut out and insert new para 11.

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11. An extension tube, fitted to the uppermost section of the mast, carries the dipole aerial. The signal collected by this dipole is transmitted to the receiving apparatus by means of a coaxial feeder (Duradio 68) suitable guided down the side of the mast and accommodated on a conical bollard.

A.L.3

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3. Page 8, Part 3, para 17. Delete in toto.

Cut out and insert new para 17.

Data Analysis

17. Having thus obtained and confirmed a value for the height of the dipole at the edges and centre of the beam, the following example shows how to determine the beam angle from the data recorded. Refer to Fig 7.

Example:-

The height (G) of the dipole above ground is found to be 19.7 feet and the ground is 2 feet (L) lower than the datum.

The height (M) shown on the indicator is 34.9 feet at Position 2 (beam centre)

The true Height (H) is, therefore (G) 19.7 feet, minus (L) 2 feet, plus (M) 34.9 feet, totalling 52.6 feet.

The distance of the mast from the aerial base is 1000 feet.

The angle required is given by $\frac{H}{D} = \tan \theta$.

i.e., $\frac{52.6}{1000} = .0526$

from the tangent tables, .0526 = 3.01 degrees.

A.L.3

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4. Unfasten the O.I.P. Remove existing Fig 7 and destroy. Insert new Fig 7.

5. Insert Annex A before Illustrations.
Re-fasten the O.I.P.

6. After incorporation of the amendments, complete the Amendment Record inside the front cover of the pamphlet.

24th June, 1965

Headquarters, Signals Command

HEADQUARTERS SIGNALS COMMAND

OPERATIONAL INSTRUCTION PAMPHLET No.255

INTRODUCTION OF I.L.S. CHECKING MAST

(MAST, TRAILER-MOUNTED, TYPE S.2/1)

AMENDMENT No. 2

1. Cover Page. Illustrations

Cut out and insert:-

I.L.S. Mast and Monitoring Equipment -

Overall Circuit Diagram ....Drg. No. SC:58708 ✓

AL2

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2. Unfasten the O.I.P. and insert Drawing No. S.C.58708 at back. Re-fasten the O.I.P.

3. On incorporation, complete the Amendment Record on the back of the front cover.

February, 1964 Headquarters Signals Command

HEADQUARTERS SIGNALS COMMAND

OPERATIONAL INSTRUCTION PAMPHLET NO. 255

INTRODUCTION OF I.L.S. CHECKING MAST

(MAST, TRAILER-MOUNTED, TYPE S.2/1)

AMENDMENT NO. 1

1. Cover Page. Illustrations

Cut out and insert:-

I.L.S. Checking Mast - Connector Layout ... Drg. No.SC:57652 AL1

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2. Unfasten the O.I.P. and insert Drawing No. S.C.:57652 after Illustration Fig. 8, Re-fasten the O.I.P.

3. On incorporation, complete the Amendment Record on the back of the front cover.

22nd October, 1963 Headquarters Signals Command