



# MILESTONES IN THE SKY







## GENERAL

The VAN-5 Distance Measuring Equipment is a light weight airborne instrument designed for general aviation aircraft. Two models are available, depending on the aircraft's primary voltage, 14 or 28 volts.

The equipment displays nautical miles (slant range) from the aircraft to the selected ground beacon, as well as displaying rate of closure (ground speed) simultaneously. This facility can be used to "home" on a ground beacon.

## FEATURES

The instrument provides 48 channels with aural identification of beacon and a Self Test facility.

Indicators show 0-100 nautical miles range and 0-300 knots ground speed.

Memory circuit permitting continued distance measurement despite short interruptions in replies.

## FACILITIES

- (1) Automatic and continuous display of slant distance in nautical miles to the selected ground beacon.
- (2) Aural beacon identification.
- (3) Automatic and continuous display of ground speed towards a beacon (rate of closure). This permits homing on a beacon by manoeuvring the aircraft so the rate of closure is maintained at a maximum.
- (4) Simple calculation of E.T.A., knowing the distance to fly and the ground speed.
- (5) Self test, by which both distance indication and beacon identification tone may be checked at any time.

## PRINCIPLE OF OPERATION

The equipment contains a transmitter, a receiver and circuits for timing, distance and speed measurement and beacon identification.

In operation, pairs of pulses are transmitted at the rate of approximately 110 pulse pairs per second. The spacing between the two pulses of a pair, and the duration of each pulse, are determined by the setting of the channel selector in the controller.

Each ground beacon is adjusted to accept one of the 48 possible combinations of pulse spacing and pulse duration. An airborne interrogator within range, transmitting with the correct combination (i.e. on the correct channel) will trigger the ground beacon which will then transmit a pulse in reply. The time between transmission of the interrogation by the airborne equipment and reception of the reply from the ground beacon is proportional to the slant distance of the aircraft from the beacon. Circuits in the interrogator automatically measure this time and display the equivalent distance on the indicator. The display is continuous since the process of interrogation and reply is repeated about 110 times per second.

The ground beacon also transmits additional pulses which form the beacon identification code and are converted into morse



A.W.A.'s research and development laboratories are an important part of its commercial and private aircraft equipment design and manufacturing activities.



On site, aircraft radio equipment testing facilities are available by A.W.A. aviation services at the major airports in all states.



A.W.A. technicians regularly check aircraft radio equipment performance against official Department of Civil Aviation requirements to ensure Maintenance of Standards.



code letters which are heard in the headphones or loudspeaker. As the distance changes, due to movement of the aircraft, the pointer of the distance indicator moves to show the correct distance. The rate of change of distance is measured and is shown by a separate (outer) pointer on the indicator. This is the rate of closure and is equal to the aircraft ground speed when heading directly towards a beacon. The speed indicator permits homing on a ground beacon by manoeuvring the aircraft so that the rate of closure is maximum.

A self test facility is provided by which both distance indication and code tone may be checked at any time.



## UNITS OF EQUIPMENT

**Interrogator VAN-5:** This is the main unit, containing transmitter, receiver and ranging circuits. It mounts on a shock-mounted rack and sockets on the front panel permit connection to other units. Removable side covers allow access to all components and pre-set adjustments are provided beneath covers on the front panel.



**Controller VCN-5:** The controller is designed to be mounted in the cockpit and has the following controls:—

- (1) A combined on/off switch and code tone volume control.
- (2) A thumb-wheel channel selector.
- (3) A self-test switch.

**Indicator VIN-5:** The indicator is designed for a standard 3½" instrument cutout and contains two separate movements.

The distance (inner) scale reads 0-100 nautical miles, with an expanded scale, for greater reading accuracy, over the range 0-30 miles.

The speed indicator (the outer scale) reads 0-300 knots rate of closure ("knots to") and 0-50 knots rate of departure ("knots from"). As an aid to homing, a knob is provided in the right-hand bottom corner which may be used to move a mechanical index so that it shows the maximum rate of closure. When flying away from a beacon, the rate of departure may be read by pressing a spring-loaded push-button in the centre of the index knob. This temporarily reverses the speed indicator so that the rate of departure is shown as "knots to".

## OPERATION

Distance measurement involves only switching the equipment on and selecting the correct channel. For detailed operating instructions, including those for the homing procedure, reference should be made to the VAN-5 Pilots' Handbook.



A.W.A. workshops with modern test instruments and fully qualified technicians are established at the principal airports of the Commonwealth.

A.W.A. aviation services maintain the radio communication equipment and aids to navigation installed in commercial aircraft using Australia's leading airports.



## TECHNICAL DATA

### Transmitter

Frequency: 206 MHz.  
Peak power: 100 W.  
Interrogation frequency: 110 pulse pairs per second (nominal).

### Receiver

Frequency: 224 MHz, crystal controlled.  
Intermediate frequency: 15 MHz.  
Lock-on sensitivity: 20  $\mu$ V. at  $+25^{\circ}\text{C}$ .

### Searching and tracking circuits

Search time: 0-100 miles in 10 seconds (increases with clutter).

Countdown performance: Operation will be satisfactory with 70% replies, 10db. above lock-on threshold, in the presence of clutter from another beacon.

Lock-on memory: Typically 5 seconds maximum.

### Identification code circuit

Tone frequency: 550 Hz.  
Power output: 50 mW into 600 ohms.

### System accuracy (including reading error)

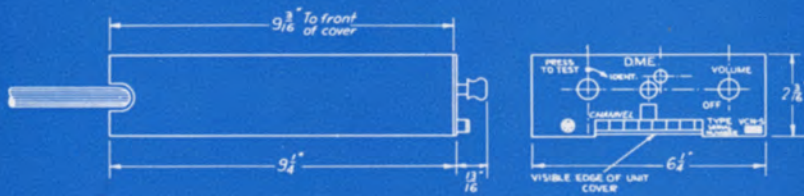
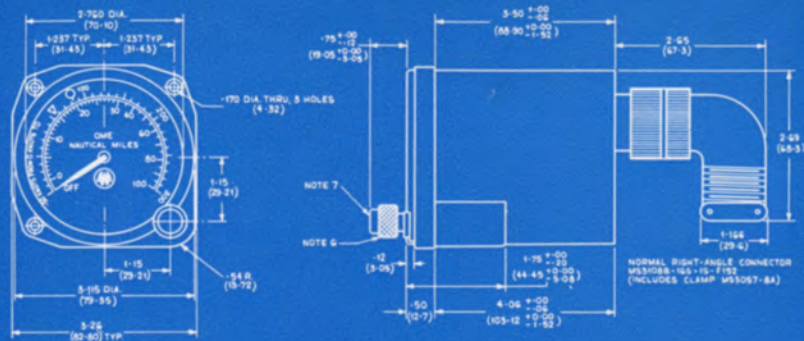
Distance measurement:  $\pm 1.3$  miles at 30 miles, increasing to  $\pm 3.8$  miles at 100 miles.

Speed measurement:  $\pm 12.5$  knots at 100 knots, increasing to  $\pm 15.5$  knots at 300 knots.

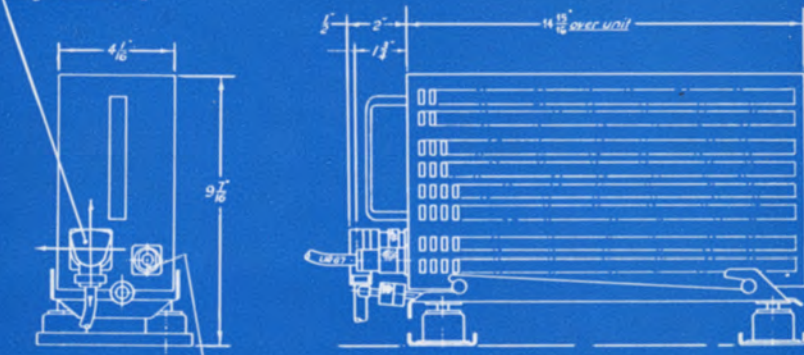
**NOTE:** Accuracy decreases at extremes of temperature.

**Power requirements:** 97 watts (approx.) at 14 V or 28 V.

**Weight of equipment:** Total 17.2 lb., not including cables.



*Cable can run-off in any of these three directions using SK-24-23C-5*



**Antenna VJN-6:** The specially-designed antenna is constructed of fibre-glass and epoxy materials and the internal structure is foamed in place in order to resist shock and vibration.

A.W.A. Aviation Radio Service Depots are maintained throughout Australasia, staffed by technicians fully qualified and experienced in all aspects of aircraft radio servicing. Efficiency is maintained, and up-to-date information is disseminated, by a D.C.A.-approved Training School.

All Depots are available for light aircraft servicing, and some have been opened specifically for this purpose. A large range of spare components is carried, both for A.W.A. equipment and for other makes.

AVIATION DEPARTMENT

**AMALGAMATED WIRELESS (AUSTRALASIA) LIMITED**

47 YORK STREET, SYDNEY  
2 0233

167 QUEEN STREET, MELBOURNE, VIC.  
67 9161