

# **TECHNICAL MANUAL**

**X-band**

**Doppler Radar Antenna Unit**

**ED 5200**

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1. Equipment Composition

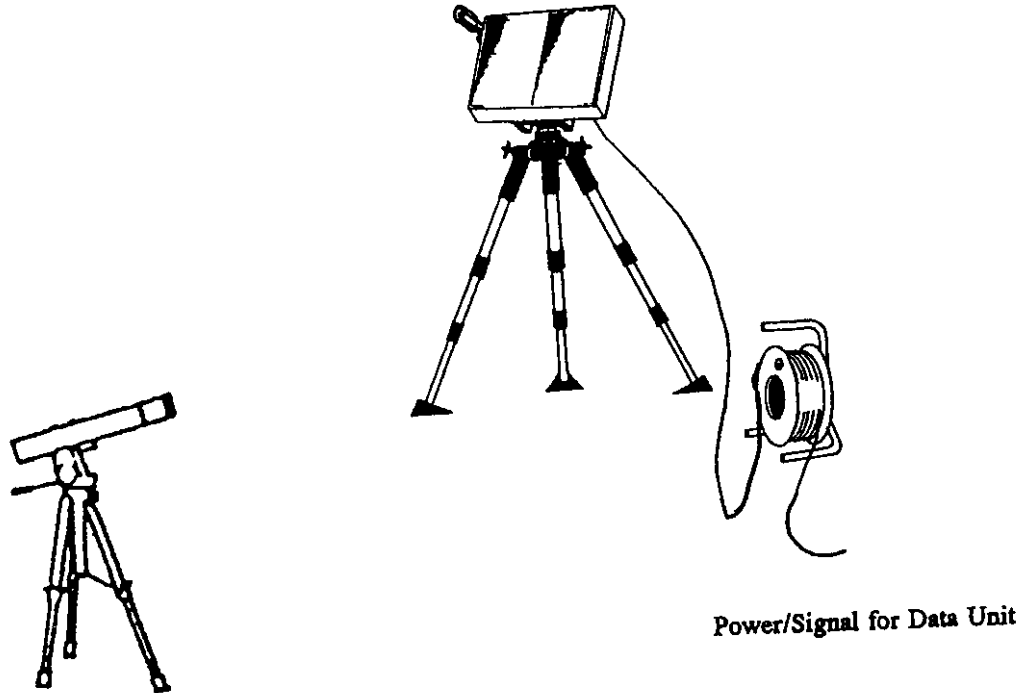


Fig. 1

The system consists of:

- a. ED 5200 Antenna Unit
- b. Telescope for optical alignment
- c. Power/signal Cable Reel
- d. X-band Test Unit ET 5000

## 2. Antenna Unit Description

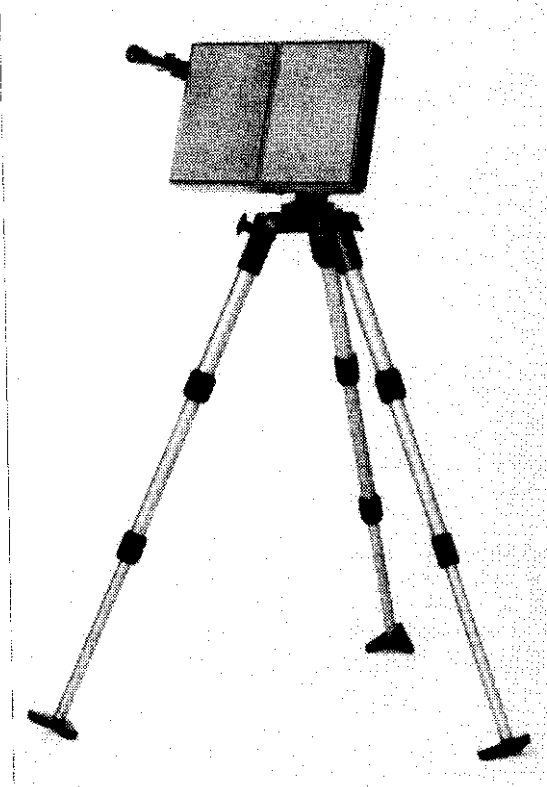


Fig. 2

The ED 5200 is a medium range Doppler radar system unit intended for use in velocity analyzing systems.

The ED 5200 is equipped with a telescope and a tripod mounting, and can be mounted on an AS 850 tripod or directly on the non-recoiling part of the gun for accurate velocity measurements.

The antenna unit contains the following parts:

- stripline receiver and transmitter antenna
- dielectric resonance oscillator (DRO)
- single sideband receiver (SSB receiver)
- AC-DC power converter
- moisture absorber/indicator.

The function of the antenna unit is to transmit a high frequency signal of the frequency 10.525 GHz nominal. A small part of this signal is reflected to the receiving antenna (by reflection) from the target. In the receiver this signal is compared with the transmitted signal. The difference in frequency between these two signals is the Doppler signal. In the Doppler signal the frequency is proportional to the radial velocity of the target relative to the antenna unit.

The Doppler signal is transmitted to the data unit for data reduction by means of the interconnection cable.

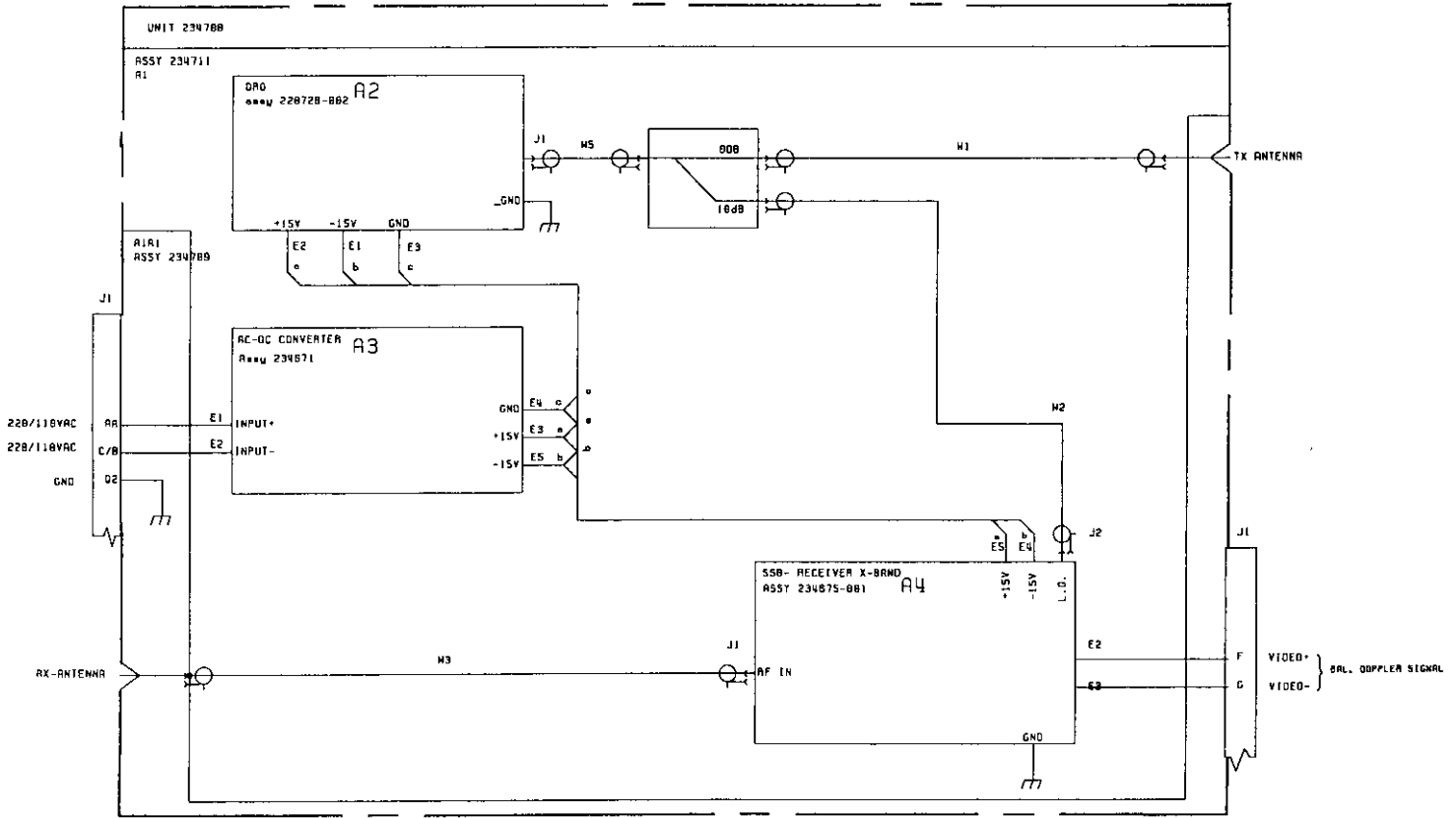


Fig. 3: ED 5200 Wiring Block Schematic

The antenna unit is powered by 220/110 V AC supplied from the data unit.

The DRO generates the high frequency signal which is fed to the Tx antenna through a directional coupler diverting the local oscillator signal for use in the receiver.

The receiver is constructed as a single sideband unit for improved range capability. The receiver can be operated in three modes:

- Mode 1: SSB mode - measurement on projectiles departing from the antenna unit.
- Mode 2: SSB mode - measurement on projectiles approaching the antenna.
- Mode 3: DSB mode - measurement on projectiles where the direction of the projectile with respect to the antenna is changing from departing from to approaching during the measurement, e.g. measurement on mortars at high elevation and low charge.

The disadvantage using the antenna in mode 3 is the fact that the performance of the receiver is decreased with approx. 20%.

The antenna will at delivery from factory be set in mode 1.

Changing between the three modes can be performed by means of a switch covered by the special screw in the back cover of the antenna.

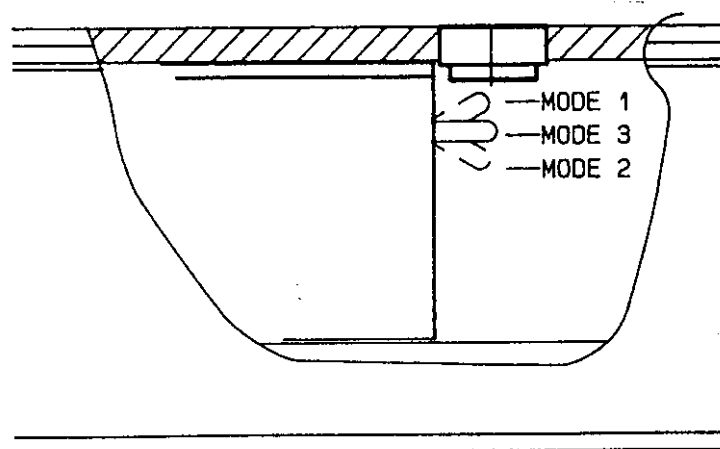


Fig. 4

The transmitting and receiving antennas are periodically modulated array antennas in a stripline configuration.

The radiation from the antenna unit is  $7^\circ$  below the perpendicular of the unit. The direction is shown in fig. 5 below.

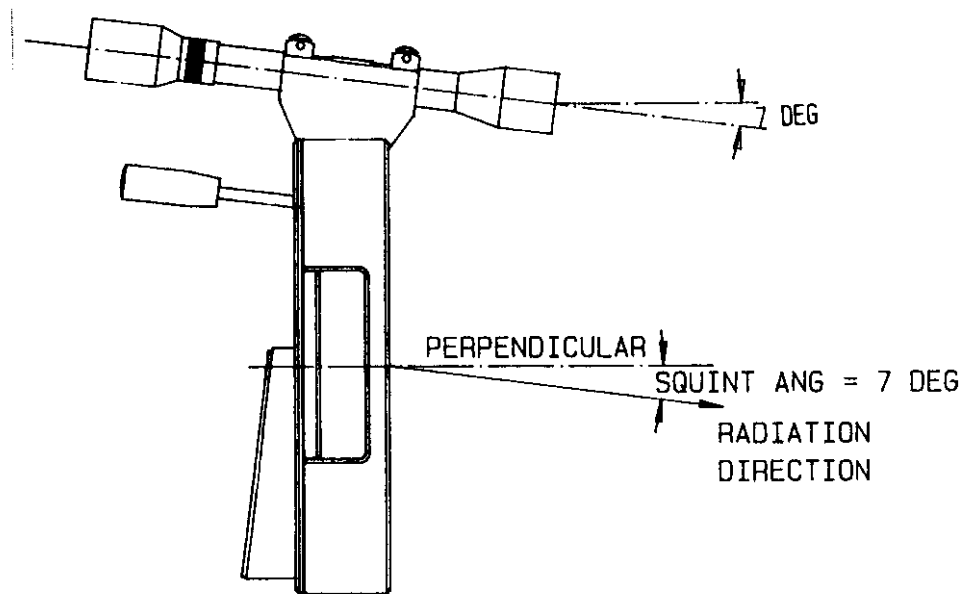


Fig. 5: Radiation direction from antenna unit

In the other direction of the antenna unit the radiation is perpendicular to the surface.

The telescope used for optical alignment is mounted in an adjustable support. The support is constructed with the following feature:

- the support can be adjusted for check of the horizontal position without changing the elevation of the antenna. In the upper position the optical axis is parallel to the electrical axis (taken into account the squint angle).

This is shown in fig. 6 below.

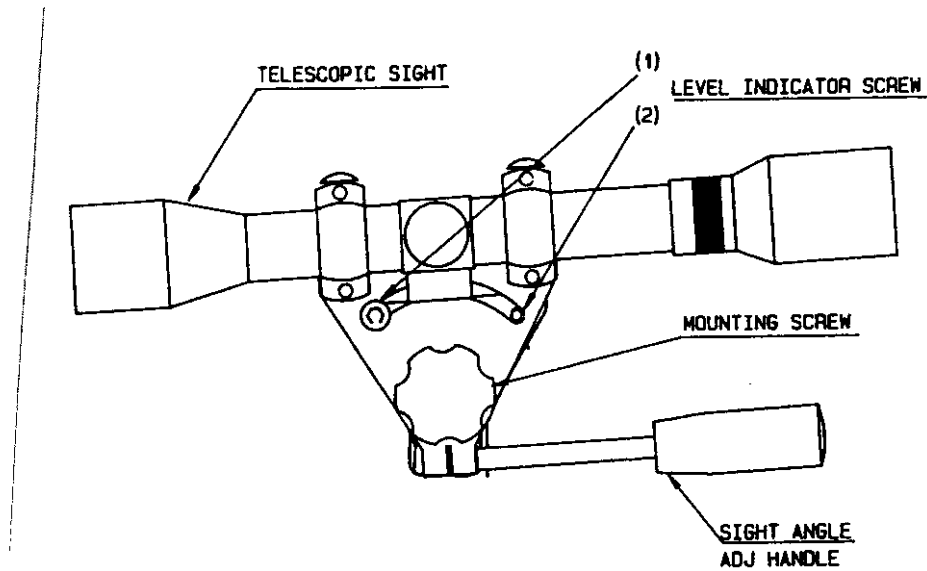


Fig. 6: Telescopic Mount

The two angle locking screws are marking the antenna line of sight for respectively:

- screw no. 1: measurement angle  $> 0$
- screw no. 2: measurement angle  $< 0$ .

The screw position is changed when the measurement angle is changed from over zero degree to under zero degree.

Additionally a moisture absorber/indicator is included. In normal operation the indicator will be blue. When the absorber is ready for replacement it will turn red.

**WARNING!** Red indicator could mean water in the antenna. Maintenance check is advisable.

The external power/signal connector is of the type MS3124E-16-8P.



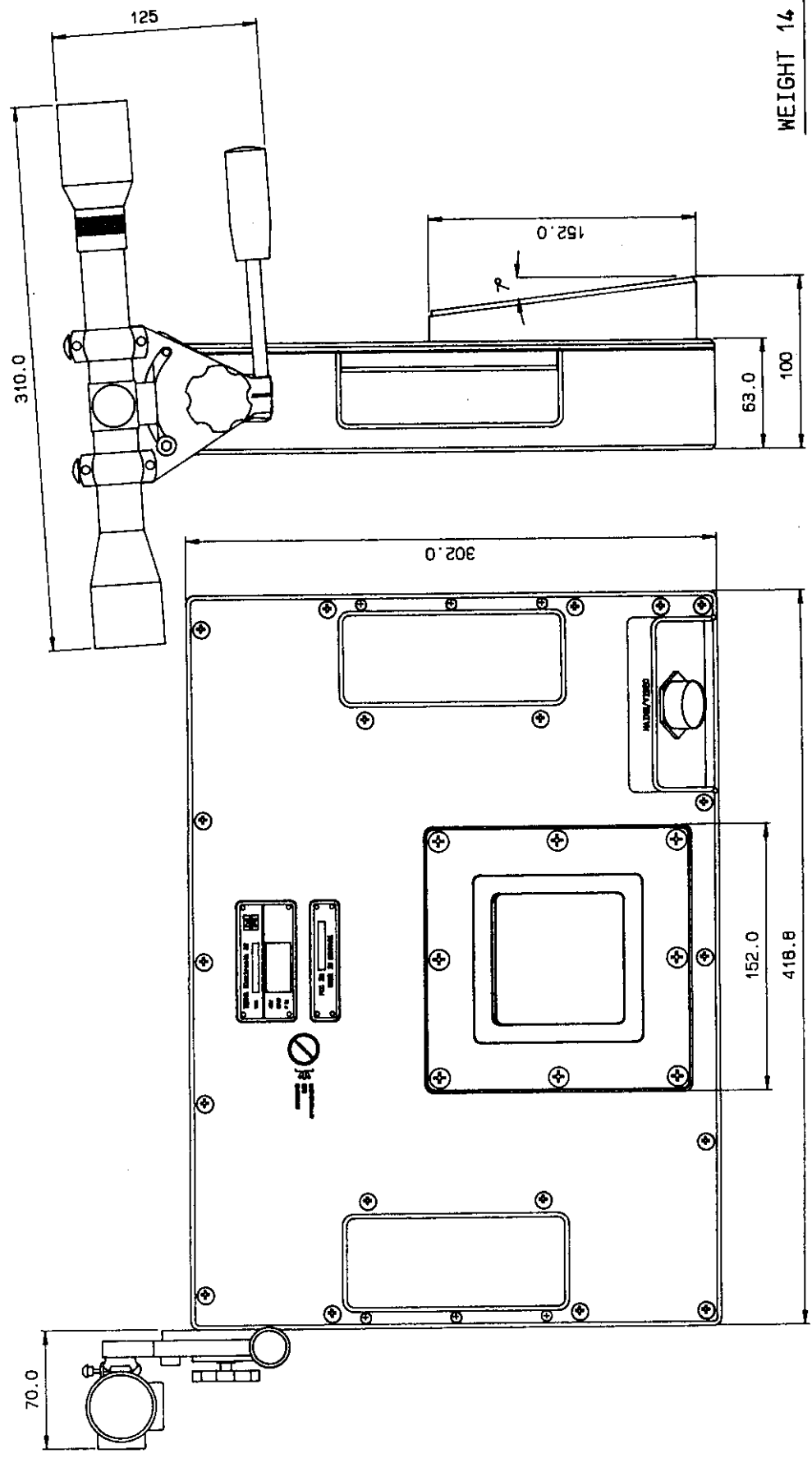
### 3. Technical Specifications

#### Specification for ED 5200:

- antenna
  - type: stripline
  - gain: > 25 dB
  - beam width: 7° x 7°
  
- transmitter
  - type: DRO (Dielectric Resonance Oscillator)
  - centre frequency: 10.525 GHz, nominal in steps of 2 MHz
  - output power: > 0.3 W
  
- receiver
  - noise figure: < 3 dB
  - band width: 2.5 - 250 kHz (50-3000 m/s)
  
- power requirements
  - voltage: 220/100 V AC +10% -20%
  - frequency: 40 - 60 Hz
  - consumption: 20 W
  
- temperature
  - operating: -20 to +55 deg. C
  - storage: -30 to +70 deg. C
  
- physical dimensions
  - size (H x W x D): 305 x 435 x 60 mm
  - weight: 14 kg
  
- theoretical range
  - range [m]: 83000 x calibre [m]

4 3 2 1

CHANGE ORDER/REVISION			
CO:	REV:	CO:	REV:
CHKD:	CM:	CHKD:	CM:



WEIGHT 14 Kg

PART NO	24V DC
234700-001	24V DC
-002	220V AC
-003	110V AC

MATERIAL:	GENERAL TOLERANCE:	PROJECTION:	TERMA Elektronik AS FRØM RØSET HORNØRANGER 4, DK-8530 LUSTRUP, DENMARK
REVISION STATUS OF SHEETS (OTHER THAN ):			
SHEET NO:			TITLE:
REVISION:			ANTENNA UNIT ED 5200
CODE: D3	1	SHEETS: 910620	DATE OF THIS ISSUE: 91.06.19
PREP: KMH	CHKD: P. Kaden	APVD: N/A	REV: A
			DOCUMENT NO: 234700 ZD
			SHEET NO: 1

4 3 2 1

4. X-band Test Unit ET 5000

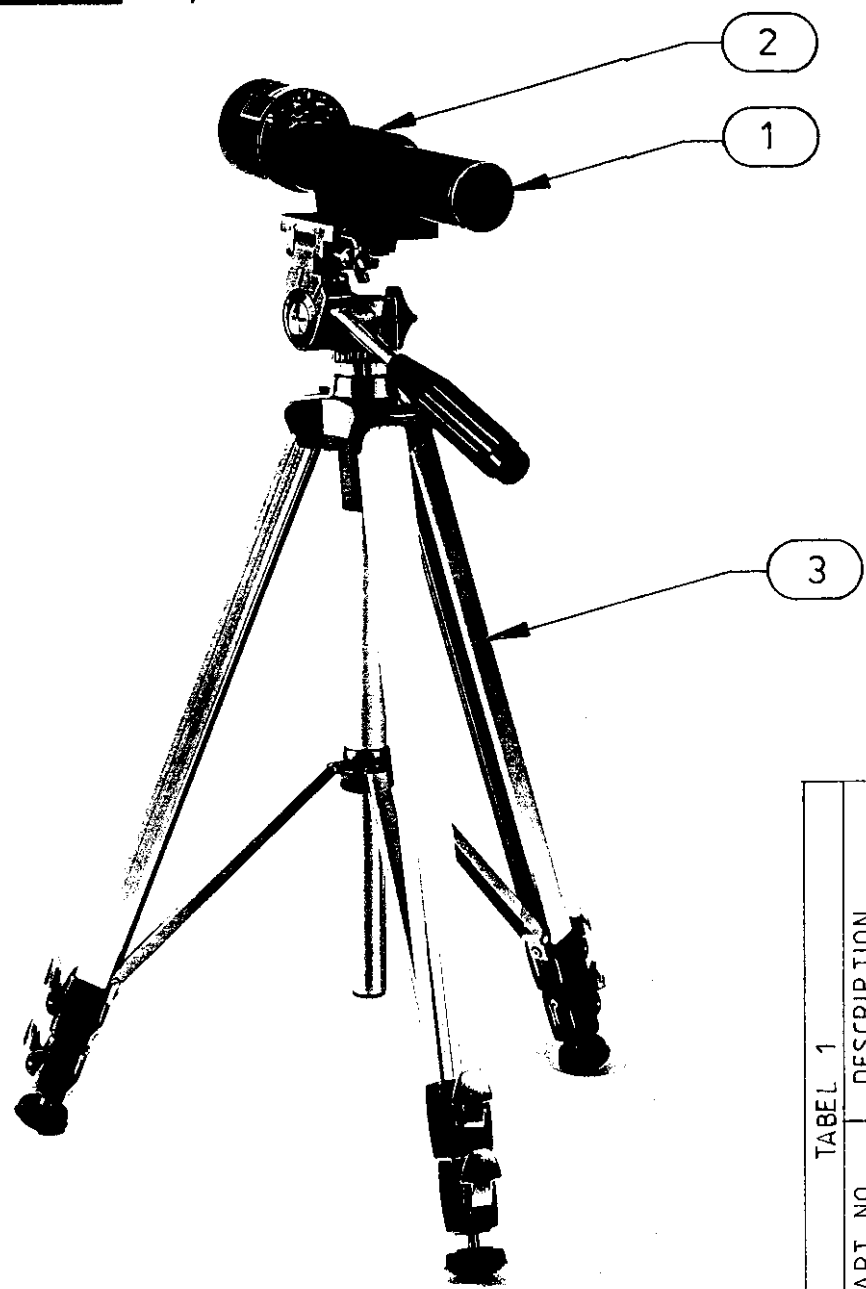
Technical Specifications:

- power requirement: 3 x 1.5 V batteries  
(Ø33 x 60 mm)
  
- physical dimensions:
  - size: Ø64 x 266 mm
  - weight: 0.8 kg (incl. batteries)
  
- simulator frequency: see table below

Test Unit Part No.	Simulator Frequency
12-203160-001	1.054 / 2.107 KHz ~ 54 / 108 Km/h
12-203160-002	4.214 / 67.429 KHz ~ 60 / 960 m/s
12-203160-003	2.107 / 67.429 KHz ~ 108 Km/h / 960 m/s

APPLICATION		REVISIONS			
NEXT ASSY	USED ON	LTR	DESCRIPTION	DATE	APPROVAL
		A		—	—
		B	KMH	88 08 12	

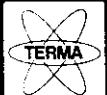
1.



TABEL 1	
PART NO	DESCRIPTION
213037-001	PAINTED OL GRN
- 002	—
- 003	—
- 101	PAINTED BROWN
- 102	—
- 103	—

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN MILLI-METRES AND TOLERANCES IN ACCORDANCE WITH DS 2075

**TERMA ELEKTRONISK INDUSTRI A/S**  
 Hovmarken 6 · 8520 Lystrup St., Århus · Danmark · Tlf. (06) 22 20 00



ANGLES:	DR.: <i>Lone Olesen</i>	830224
LIN. DIM.:	CH.:	
MATERIAL:	AP.:	
	AP.:	

TITLE	TEST UNIT SYSTEM
SIZE	
CLASS:	NO.:
00	213037