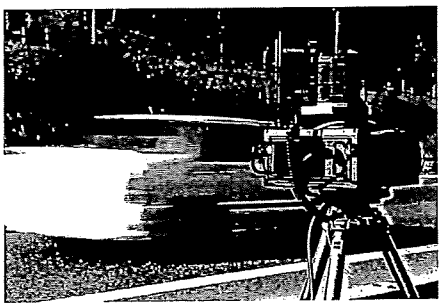
# 6F Operating Instructions

# Multanova – Radar 6F – 2



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## Multanova 6F Radar

## Contents


MULTANOVA 6F RADAR 1-2

1. Symbols and notes 1-5

2. Technical data 2-6

3. Introduction 3-8
3.1 Doppler radar antenna DRS-2 3-8
3.2 Central control unit ZSE 3-9
3.3 Operating unit BG 3-9
3.4 Camera unit FT 3-9
3.5 Flash units 3-10
3.5.1 Flash unit MB-2E 3-10
3.5.2 Flash unit MB- 2A 3-11
3.5.3 Flash unit MB- SA "Secondary flash" 3-11
3.6 Measuring sequence 3-11
3.6.1 General 3-11
3.6.2 Receding traffic 3-12
3.6.3 Approaching traffic 3-13

4. Equipment configuration 4-15
4.1 Vehicle mounting (example) 4-15
4.2 Tripod mounting (example) 4-16
4.3 Vehicle mounting with remote tripod (example) 4-17

5. Setting up the radar antenna DRS-2 5-18
5.1 Vehicle mounting (see diagram on page 5-20) 5-18
5.2 Tripod operation 5-19

6. Installation of central control unit (ZSE) 6-20
6.1 Vehicle operation 6-20
6.2 Tripod Operation 6-20

7. Setting up and aligning the installation 7-21
7.1 Selection of measuring point 7-21
7.2 Setting up the measuring vehicle 7-22
7.3 Checking the alignment of the DRS- carrier 7-22
7.3.1 Sighting rod with front and back sights (illustrated on page 7-25) 7-22
7.3.2 Control bar (illustrated below) 7-23
7.4 Setting up the tripod (illustrated on page 7-27) 7-24

8. Operating the camera unit 8-26
8.1 Camera unit FT-2 (Jacknau) 8-26
8.1.1 Preparation of camera unit 8-26
8.1.2 Mounting of camera unit 8-26
8.1.2.1 Vehicle mounting 8-26
8.1.2.2 Tripod operation 8-26
8.1.3 Adjusting the camera 8-27
8.1.4 Use of a polarizing filter 8-27







8.1.5 Data bas 8-28
8.1.6 Checking the data display 8-29
8.2 FT/ 6FR camera unit (ROBOT) 8-31
8.2.1 About these operating instructions 8-31
8.2.2 Type plates 8-31
8.3 Safety measures 8-32
8.3.1 Operator's safety 8-32
8.4 Description of the product 8-32
8.5 Setting to work 8-34
8.5.1 Preparation of the motor recorder 8-34
8.5.1.1 Setting up the objective 8-34
8.5.1.2 Choice of film-material 8-35
8.6 Ports 8-39
8.7 Care and maintenance 8-40
8.8 Faults - causes and remedies 8-41
8.9 Technical data 8-41
8.9.1 Allocation of ports 8-42

9. Operating the flash units 9-43
9.1 Flash unit MB- 2E (vehicle mounting) 9-43
9.2 Flash unit MB- 2A 9-44
9.3 Front photography with red flash 9-45

10. Operating unit BG 10-46

11. Switching on and Checking 11-47

12. Measuring operation 12-60
12.1 Alarm indications 12-70
11.1.1 Main alarms 12-70
11.1.2 Secondary alarms 12-75
12.2 Setting the sensitivity and inclination of the DRS 12-78

13. Evaluation of photographs 13-80
13.1 Direction of traffic 13-80
13.2 Reconstruction of active radar zone on the photographs with lens focal lengths of 85 mm or 75 mm 13-80
13.3 Evaluation of photographs of receding traffic 13-82
13.4 Trucks in receding traffic 13-84
13.5 Evaluation of photographs of approaching traffic 13-85
13.6 Use of 135 mm and 150 mm lenses 13-87

14. Operation of unit with bridge tripod 14-89
14.1 General 14-89
14.2 Selection of measuring points 14-89
14.3 Setting up and adjustment 14-89
14.3.1 Setting up the tripod 14-89
14.3.2 Adjusting the installation 14-91
14.4 Evaluating of photographs 14-92

15. Tacho projection TE- 6F 15-93
15.1 Equipment configuration 15-93
15.2 Installation 15-93
15.3 Calibration check of the tacho measurement 15-93
15.4 Operating mode 15-96
15.5 Film analysing 15-97

16. Moving Radar MR-6F 16-98
16.1 Introduction 16-98
16.2 Installation 16-99
16.3 Calibration check of the tacho measurement 16-99
16.4 Mode of operation 16-99
16.5 Operating mode 16-99







16.6 Evaluation of photographs 16-102
16.7 Peculiarities of the moving radar 16-103
16.8 General hints and contact 16-104

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# 1. Symbols and notes

Safety instructions and general notes are classified in these operating instructions in two classes:

**IMPORTANT!**

This symbol is shown when there is a direct threat of danger. Failure to observe the safety instructions might cause damage to health of the operator or damages of the unit.

**NOTE**

Notes which are important for the proper use of the system and its components are indicated with this symbol.

# 2. Technical data

| | | |
|---|---|---|
| **Transmission frequency** | | 34,3 GHz |
| **Transmitter power** | | typically 0,5 mW |
| **Antenna gain (with respect to isotropic antenna)** | | 30 dB |
| **Antenna half power beam width** | | horizontal 5°<br>vertical 5° |
| **Measuring angle with respect to direction of travel** | | 22° |
| **Accuracy** | | 25 - 100 km/h: +/- 3km/h<br>(15- 60 mph: +/- 2 mph)<br>100 - 250 km/h: +/- 3%<br>(60-160 mph: +/- 3%)<br>(rounded up to the nearest integral value) |
| **Range** | Setting | Absolute Range / Corresponding lateral distance |
| | long | 40 m approx. / 15 m approx. |
| | medium | 15 m approx. / 6 m approx. |
| | short | 7 m approx. / 3 m approx. |
| **Measuring direction** | | Approaching or receding traffic or both directions simultaneously. |
| **Power supply to radar unit** | | Voltage 11 V - 14,5 V<br>(separate lead-acid battery |





# 3. Introduction

In comparison with traffic speed measuring units formerly available, the MULTANOVA Radar Unit 6F represents a significant innovation in many respects:

- The radar antenna has very small dimensions with very good beam concentration.
- The Doppler signals generated during the passage of a vehicle are tracked accurately and checked by a digital computer in the central control unit (ZSE).
- Operation of all equipment connected to the central control unit ZSE (DRS, camera unit FT, electronic lash MB, printer if necessary) is performed via a small and handy operating unit (BG).

The individual units and the measuring procedure are briefly described in the following pages.

## 3.1 Doppler radar antenna DRS-2

The half-power beam width of a radar antenna is largely determined by the relationship between wavelength of the radar radiation on one hand and diameter of the antenna on the other. The half-power beam width of the radar antenna should be kept as small as possible in the interest of precision in the speed measurement (highly concentrated beam, narrow radar lobe, low angle error). This objective can be approached by reduction of the wavelength (i.e. increase of transmission frequency) or by enlargement of the antenna diameter. The wavelength of the radar radiation should, above all, be kept as short as possible to ensure that the antenna need not be dimensioned too large.

The present unit uses the transmission frequency 34.3 GHz (+/-100 MHz), i.e. approx. 34,300,000,000 oscillations per second. The corresponding wavelength is approx. 8.75 mm. The advantages offered are as follows:

- The dimensions of the DRS are so small that it can be largely concealed in a vehicle.
- Despite the small dimensions the beam concentration is so good that a higher measurement precision is achieved.

Full advantage can only be taken of this high concentration, however, if sufficient care is taken when setting up the unit. An angle deviation of 1° causes a measuring error of around 0.7%.





| | | |
|---|---|---|
| | | of at least 10 AH capacity)<br>Current typical 2.5 A |
| **Camera** | | Model Jacknau / Robot 35 DET<br>Exposure / 1/500 s fix. 1/750 fix.<br>Lens Nikor / Schneider<br>1:2/85 mm / 1:3.8/75mm<br>Picture size / 42x 36mm 24x 35mm<br>Exp. rate / 2 frames/s 2 frames/s |
| **Angle between optical axis and direction of travel** | | 16° for vehicle mounting axis<br>19° for tripod operation. |
| **Electronic flash:** | | -MB - 2E built- in flash<br>-MB - 2A mobile flash |
| **Flash energy** | Basically<br>Option | 85 Ws. or 170 Ws. (selectable)<br>170 Ws. or 340 Ws. (selectable) |
| **Recharging time** | | at 85 Ws: 0,8 s<br>at 170 Ws: 1,5 s<br>at 340 Ws: 3,0 s |
| **Power supply** | MB - 2E | Separate lead- acid battery with 10 Ah min. capacity. |
| | MB - 2A | Battery pack with charger.<br>Capacity:<br>approx. 200 flashes at 170 Ws.<br>approx. 100 flashes at 340 Ws.<br>Charging time from mains: approx. 8h.<br>Or: Separate lead- acid battery with 10 Ah min. capacity |
| **Operational temperature range** | | |
| Radio antenna DRS - 2 | | - 20° C to + 60° C |
| Central control unit ZSE / 6F | | - 10° C to + 50° C |
| Operating unit BG/6F | | 0° C to + 45° C |
| Camera Units FT - 2 (Jacknau) and MultiScript (Robot) | | - 10° C to + 50° C |

## 3.2 Central control unit ZSE

The Doppler signal generated by the radar unit during the passage of a vehicle is taken to the ZSE, where it is amplified, filtered and converted to a series of pulses.

The direction of travel of the vehicle detected is also determined by means of a further signal generated by the DRS.

The series of pulses generated in synchronism with the Doppler signal and the information concerning direction of motion are fed to a digital computer.

Various processes then run in a specific sequence in the computer. This produces a whole series of data and answers questions, which are more fully described in section 2.6 Measuring sequence).

The ZSE has neither operating elements nor indications. DRS, BG, FT, MB and possibly a printer are connected to it.

## 3.3 Operating unit BG

The BG contains all operating and indicating functions for the entire system. A continuous exchange of data takes place between BG and ZSE via a serial interface.

The operating conditions for DRS, FT, MB and for data processing in the ZSE set on the BG are received by the ZSE and transmitted to the other parts of the system.

Conversely, all indications from the system components are combined in the ZSE and transmitted to and displayed by the BG.

## 3.4 Camera unit FT

The camera unit FT/6FJ is fitted with a Jacknau recording camera with a fixed shutter speed of 1/500 second. The camera unit FT/6FR has a 36 DET Robot motor recorder and a fixed shutter speed of 1/750 second.

At the instant of exposure

- The rear (for receding traffic)
- the front (for approaching traffic)

of the vehicle being measured is within the evaluation range of the photograph, which is determined more closely with the aid of the evaluation instructions (Section 12).

If the vehicle photographed is in the receding traffic, the permissibility of the shot has already been determined before the camera is actuated.





In order to show the front of the vehicle in each case for approaching traffic, the exposure is made at an instant at which the measured value has been formed, but verification not yet performed.

Therefore must the system wait for a certain time period before projecting the data into the picture and film feed until the measuring sequence, as described in 2.6, is completed. If the measuring sequence leads to cancellation of the measured value, this is indicated by projection of four horizontal lines (- - - -) instead of a speed value on the photograph.

The film is only wound on following the display projection.

## 3.5 Flash units

The flash unit consists of high voltage converter, capacitor unit and flash light.

The high voltage converter converts the battery voltage to a voltage of 450 V necessary for flash operation. Since the charging time must be kept short, a large current flows (approx. 50 A) during the charging phase, which is a heavy load on the battery.

The discharge current of the flash capacitors via the flash tube during the flash process, however, is very high and of short duration (peak approx. 1,000 A, duration approx. 1/1000 s).

The capacitor unit can be fitted as required with 2 or 4 flash capacitors. Full or half flash power can be set on the operating unit in both cases. The version with 2 flash capacitors delivers 85 or 170 Ws respectively with charging times of 0.8 or 1.5 s. The maximum number (4 flash capacitors) provide 170 or 340 Ws with charging times of 1.5 or 3.0 s respectively.

The flash unit is provided with an overload protection device. If the flash unit is operated in rapid succession, an interval of approx. 2 minutes is interposed to protect the flash tube from overheating. No further exposures can be made during this time. The "Flash alarm" indication is given in the BG.

The charge of the supplying battery is checked automatically during each charging phase of the capacitors. The high voltage converter is disconnected automatically when the battery charge reaches a lower limit. The "Flash batt." indication is given in the BG. The ZSE blocks any further camera exposures.

The flash unit may only be dismantled or opened by qualified technicians for servicing purposes.(Caution: high voltage!)

### 3.5.1 Flash unit MB-2E

The MB-2E is provided for fixed mounting in the measuring vehicle. The converter must be fitted close to the battery feeding it owing to the high supply current. Since the charging current of the flash capacitors is not very high (approx. 1 A) the capacitor unit may be fitted some distance away from the converter.

The capacitor unit must be fitted as close as possible to the flash light in order to avoid losses in the connecting cable, which would unnecessarily reduce the flash energy. Since the flash light of





the digital computer from vehicles moving in this direction. Consequently the vehicle detected in this case must belong to the receding traffic.

f the system is set for exclusive measurement of approaching traffic, it can be deduced in a similar way that the vehicle detected must be in the approaching traffic.

In the case where the system is to detect both traffic directions (combined operation) the direction of motion of the vehicle detected is determined immediately after starting the measuring cycle.

If it is part of the receding traffic, only signals from the receding traffic are fed to the digital computer during the remainder of the measurement. Similarly, if the vehicle detected is in the approaching traffic, the digital computer will only receive signals from approaching traffic during the remainder of the current measurement. This consistent separation of the two directions of motion is extremely important for the subsequent evaluation of the photographic records. If a vehicle is detected in a given direction, then it is ensured that vehicles in the other direction cannot have a falsifying influence on the result during the course of the current measurement. A cancellation of the measured value (e.g. by covering of an approaching vehicle by a receding vehicle) is possible, but not a falsification of the measured value.

The unit performs an internal quartz test during each measuring sequence, shortly after production of the measured value. No indications of results of the quartz tests appear during measurements, provided they are successful.

A difference must now be drawn between approaching and receding traffic for the further description of the measuring sequence.

### 3.6.2 Receding traffic

The digital computer performs a continuous evaluation of the Doppler signal frequency with regard to constancy. The Doppler frequency must satisfy strict uniformity criteria over a section corresponding to at least 25 cm (constant section). If a uniform section of this kind is found within the first section length of 2 m (vehicle front between positions 2 and 4) then the Doppler frequency is averaged over the constant section and converted to a speed value in km/h. This calculated value of speed is immediately displayed on the BG.

If no constant section is found within the first signal section of 2 m, the current measurement is cancelled. The cancellation display (- - - -) appears on the BG.

If a constant section is found, a test of the measured value determined is performed in the further measuring sequence (verification phase).

During this verification phase, the frequency of the Doppler signal is measured continuously and compared with the measured value determined earlier. Deviations greater than about +3% or -3% continuing over a section longer than 1 m will result in an interruption of the verification phase.

If the distance covered by the car measured from the start of the verification phase until its interruption was shorter than 3 m, the measurement will be cancelled. The measured value determined could not be confirmed over a sufficient distance and can therefore not be considered as secure. In such a case, a valid attribution of the measured value to a particular vehicle can not be guaranteed. As a consequence, the speed value displayed on the BG disappears and the cancellation display (- - - -) appears. Even if the photo speed limit was exceeded, no camera triggering will occur.





the built-in flash is normally mounted on the vehicle bumper, it is recommended to fit the capacitor unit in the front section of the engine compartment.

### 3.5.2 Flash unit MB- 2A

The flash unit MB-2A is specially designed for tripod operation.

It can also be used for vehicle operation for those cases in which the flash light must be removed from the vehicle for photo-technical reasons and brought close or set at a different angle to the photo position.

The power supply to the MB-2A is either from

- "battery pack" or
- separate lead acid battery.

The battery pack is attached for easy exchange on the MB-2A.

In addition to a battery, it contains a power pack, which can charge the fully discharged battery within approx. 8 hours. Recharging of partly or fully discharged batteries should always be performed immediately after use.

The MB-2A flash unit can be supplied as an option with a removable light. This light is provided with a magnetic the aid of an extension cable. A reduction of the effective flash energy must be expected in this case. The MB-2A is driven by cable from the ZSE.

### 3.5.3 Flash unit MB- SA "Secondary flash"

If a further flash is required for technical reasons, an additional MB-2A can be used. This is operated without cable by an attachable optical flash release. It then operates as "Slave" to its actuating "Master flash unit". The function of the actuating flash unit can be provided by an MB-2E permanently fitted in the vehicle or an MB-2A connected by cable to the ZSE.

With the non-wired form of drive the flash unit is always set to full power. Alarm indications cannot of course be given with this arrangement.

## 3.6 Measuring sequence

### 3.6.1 General

The positions and sections of importance for the measuring sequence during the passage of a vehicle through the radar beam are shown in the diagram on page 18.

The front of an approaching or receding vehicle enters the radar beam at position 1. From this instant the radar antenna delivers a continuous Doppler signal to the ZSE. The digital computer requires a continuous Doppler signal of a specific length before it "knows" that a vehicle is in the radar beam. The actual measuring cycle only begins when the front of the vehicle has covered a certain distance in the radar beam (e.g. to position 2).

If the system is set for exclusive measurement of receding traffic, Doppler signals are only fed to

If the distance covered by the car measured from the start of the verification phase until its interruption was exceeded the 3 m - limit, a camera exposure takes place, if the photo speed limit was exceeded. The measured value will however not yet be superimposed. Also the film feed will at first hand be delayed.

During the following measuring sequence (checking phase), the reason for the interruption of the verification phase will be determined. The following possibilities must be considered:

1) the car measured has left the radar beam,
2) a second vehicle (with a speed different from the speed of first vehicle) entered the radar beam,
3) the formation of a Doppler signal with a diverting frequency caused by multiple reflections of the radar beam.

In order to determine the cause of the interruption, the Doppler signal is again evaluated for constancy.

If, within a time interval corresponding to a distance of 2 m after interruption of the verification phase, no constant section is found, this interruption was caused by the exit of the car measured.

If, however, a constant section with a diverting speed value is found within this time interval, this interruption was caused by a second car entering the radar beam or by the formation of multiple reflections.

Only if it can be determined, that the verification was interrupted by the exit of the car measured, the valid attribution of the speed measured to a particular vehicle can be guaranteed. In this case, the measured speed value will be superimposed to the picture and a film feed will take place.

In case the verification phase was interrupted by the entry of a second car or by the formation of multiple reflections, the validity of the measured speed value is doubtful.

Since the entry of a second vehicle can not be properly distinguished from the formation of multiple reflections, the measurement as well as the camera exposure must be invalidated before a film feed takes place..

After camera actuation (including data display projection and film feed) the digital computer waits for a signal gap corresponding to a distance of 0.5 m before a subsequent measuring sequence can be initiated.

Even if no camera exposures were made, a signal gap corresponding to a distance of 0.5 m is awaited before starting the following measurement.

Since the overall length of the measured vehicles is determined before the camera is operated (when measuring receding traffic), long vehicles can be detected separately by setting special speed limits.

### 3.6.3 Approaching traffic

As soon as the determination of a reliable speed value between the front positions 2 and 4 (for example at front position 3) has been completed and it is found that the measured vehicle should be photographed, the camera must be actuated immediately. No further time must elapse, since the vehicle registration plate would otherwise no longer appear on the photograph.

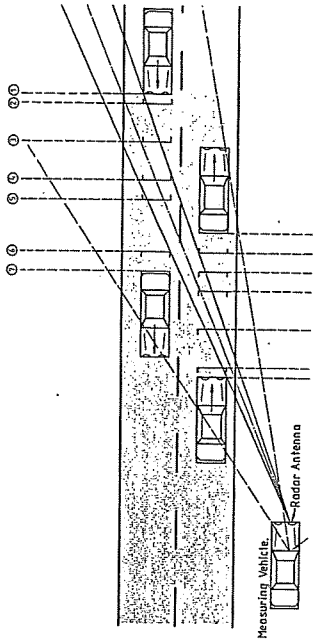
Since now the camera has been actuated before the verification and the subsequent checking phase are accomplished, there is a delay before data display projection (and therefore also of film feed) until the vehicle has left the radar beam.





If the measured car covered a distance in excess of 3 m during the verification phase and if no constant sections with deviating speed values were found during the checking phase, the measured value can be displayed when the vehicle leaves the beam.

If, however, the verification phase was interrupted before the measured car covered a distance of 3 m or if the presence of a second car was detected during the checking phase (or the formation of multiple reflections can not be excluded), the cancellation display (- - - -) is shown instead of the speed value.

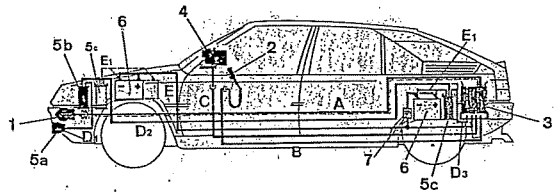






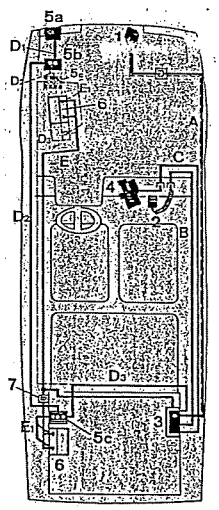

# 4. Equipment configuration

## 4.1 Vehicle mounting (example)




| | |
|---|---|
| 1 | Radar antenna DRS-s with connecting cable * |
| 2 | Operating unit GB/ 6F with connecting cable |
| 3 | Central control unit ZSE/ 6F inserted in connecting frame |
| 4 | Camera unit FT/ 6FJ with connecting cable |
| 5a | Flash light for electronic flash unit MB- 2E |
| 5b | Capacitor pack for MB-2E (Must be mounted very close to flash light) |
| 5c | Flash converter for MB-2E |
| 6 | 12V battery |
| 7 | Battery cut- off relay if auxiliary battery is charged by the car generator |
| A | 8m 12- core screened control cable incl. fitting plug * |
| B | 6m 10- core control cable incl. fitting plug |
| C | 6m 10- core control cable incl. fitting plug |
| D1 | 7- core cable mounted to flash light |
| D2 | 8m 3- core control cable mounted to converter |
| D3 | 2m or 10m 10-core control cable, depending on type of installation |
| E | Supply cable 4 x 1.5 mm² 8m |
| E1 | Supply cable 2 x 1 mm² 3 m |

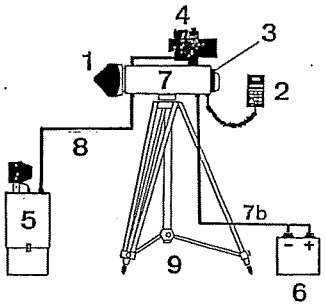
* DRS-2 and fitting plug must be insulted from the vehicle chassis!





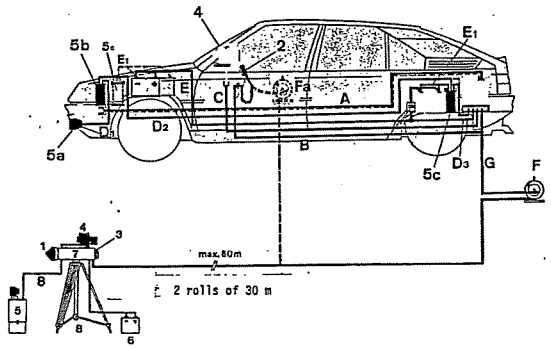



## 4.2 Tripod mounting (example)




| | |
|---|---|
| 1 | Radar antenna DRS-2 with connecting cable and plug |
| 2 | Operating unit BG/6F with connecting cable and plug |
| 3 | Central control unit ZSE/6F |
| 4 | Camera unit FT/6FJ with connection cable and plug |
| 5 | Electronic flash unit MB-2A with battery pack |
| 6 | 12 V battery (min. 10 Ah) |
| 7 | Tripod chassis with fixing devices for DRS-2, ZSE/6F and camera unit FT/6FJ, including all connection plugs and 2 m supply cable |
| 8 | 8 m connecting cable for MB-2A |
| 9 | Tripod |

## 4.3 Vehicle mounting with remote tripod (example)




F 1 or 2 cable reel(s) each with 10- core 30m extension cable for connection or opera ting unit BG/ 6F

G 10- core auxiliary cable of 2m for direct connection of cable reel to connecting frame.





# 5. Setting up the radar antenna DRS-2

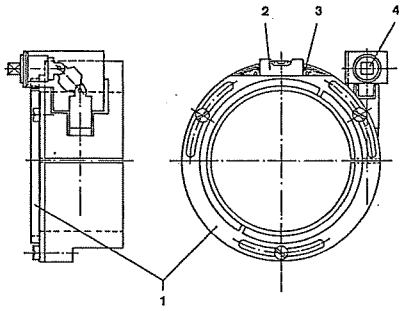
## 5.1 Vehicle mounting (see diagram on page 5-18)

- Release clamping screw (4) of antenna carrier. Remove cover if necessary.
- Before installing the DRS draw its cable through the carrier. The DRS can then be placed in the carrier. The pin located at the back of the antenna housing must engage in one of the notches on the levelling ring (I).
- The DRS cable should be connected to the insert plug fitted in the motor compartment.
- The inclination of the DRS should be set with the aid of the spirit level (2) fitted on the leveling ring (I) and the degrees scale (3) so that it corresponds with the local camber of the road. If the road has no camber, the inclination of the DRS is set horizontally with the aid of the spirit level. This also compensates for any lateral inclination of the vehicle with respect to the road.
- Tighten clamping screw (4).

If vehicles in the more distant lanes are frequently not detected during later measurements, the DRS inclination is usually set too high.

If too many cancellations occur during subsequent measurements, the DRS inclination is usually set too low.

The inclination must be suitably corrected in both cases.








## 5.2 Tripod operation

The DRS must be installed before aligning the tripod chassis as described in section 6:

- First draw the DRS cable through the carrier.
- Then place the DRS in the carrier, set the DRS notch to 00 and tighten the clamping screw of the DRS carrier.

If vehicles in the more distant lanes are frequently not detected during later measurements, the DRS inclination is probably set too high.

If too many cancellations occur during subsequent measurements, the DRS inclination is probably set too low.

The inclination must be suitably corrected in both case.





# 6. Installation of central control unit (ZSE)

## 6.1 Vehicle operation

The ZSE should be inserted in the connecting frame provided in the patrol vehicle for this purpose so that the plug engages.

It should be secured with the straps.

Insert DRS cable plug in front of ZSE.

## 6.2 Tripod Operation

Insert ZSE in tripod chassis until the plug engages.

Secure ZSE with the straps.

Insert DRS cable plug in front of ZSE.

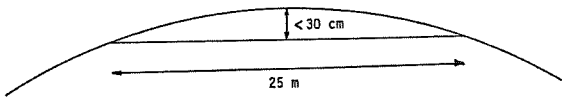
# 7. Setting up and aligning the installation

## 7.1 Selection of measuring point

The traffic lane to be monitored must run straight in the direction of measurement from the location of the DRS for a certain distance depending on the lateral distance from the edge of the lane monitored according to the following table.

| lateral distance to traffic lane | minimum length of straight road section |
|---|---|
| up to 2 m | 25 m |
| up to 5 m | 35 m |
| up to 10 m | 45 m |
| up to 15 m | 60 m |

A section of road is considered straight for the purpose of these operating instructions if it has a radius of curvature greater than 260 m. This is true when the deviation of a suitable reference line (e.g. road edge, median line, etc.) is less than 30 cm from a straight line at the centre of a section 25 m long.




Deviations from this regulation have to be discussed with the manufacturer or its authorized agents.

There must be no obstructions in the active range of the antenna (see section 12) up to the traffic lane monitored. The following additional instructions are intended as recommendations to be noted:

- It is preferable to set up the unit on the side of the road nearest the traffic lane to be monitored.
- Frontal shots of vehicles moving at high speed are most successful when the lateral distance of the camera from the lanes being monitored is between 3 and 6 m.





## 7.2 Setting up the measuring vehicle

Park the measuring vehicle exactly parallel to traffic lane(s). Alignment of the vehicle can be performed by one of the following methods:

- by means of an auxiliary sighting device (markings at the center of front and rear windows)
- by measuring the wheel distance from the edge of the road, taking account of the difference between front and rear track widths.

## 7.3 Checking the alignment of the DRS- carrier

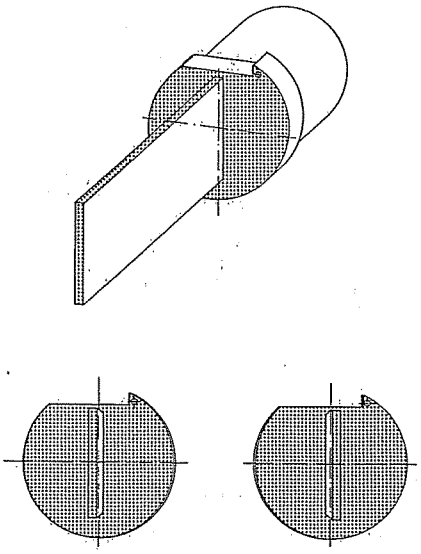
The DRS-carrier is set up exactly parallel to the vehicle axis when fitted in the vehicle. This alignment must be checked periodically about once monthly. Especially if it is suspected that the carrier could have been twisted by a blow for example, its alignment must be checked. It can be checked with the aid of one of the following devices after setting up the vehicle in accordance with 6.2.

### 7.3.1 Sighting rod with front and back sights (illustrated on page 7-23)

- Release clamping screw of DRS-carrier. Remove cover or DRS if necessary.
- Insert sighting rod in carrier. This engages in a notch on the levelling ring of the carrier.
- Set sighting rod vertically by means of the spirit level on the levelling ring.
- Tighten clamping screw of carrier.
- The distance to the side of the road (or to another suitable reference line parallel to the axis of the road) is measured from a point vertically below the sighting rod.
- A position-finding rod held vertically is then set up at a distance of approx. 10 m in front of the vehicle at the lateral distance from the side of the road previously measured (or from the reference line selected above).
- Exact alignment of the DRS-carrier can be checked with the aid of the sights and the mirror.
- If an error found in the alignment of the carrier, corresponding to a lateral displacement greater than 5 cm of the position- finding gord, this must be corrected by the service department responsible







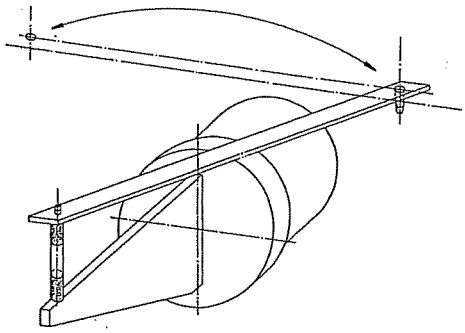
### 7.3.2 Control bar (illustrated below)

- Release clamping screw of DRS-carrier. Remove cover or DRS if necessary.
- Insert control bar in carrier. This engages in a notch on the levelling ring of the carrier.
- Set control rod vertically with the aid of the spirit level on the levelling ring.
- Tighten clamping screw of carrier.





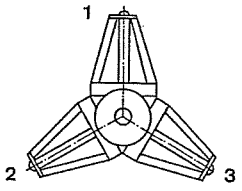
- Place control bar on spacing bolt on control rod. The pin on the control bar must then fit in both holes drilled in the body without applying force.
- If any deviation is found, the alignment of the DRS-carrier must be corrected by the service department responsible.



## 7.4 Setting up the tripod (illustrated on page 7-25)

Set up tripod at least 0.5 m from edge of road. The height of the tripod head must not be more than 1.5 m above the road.

It is recommended to set up one of the three tripod legs as seen from the tripod head parallel to the road axis, so that the longitudinal inclination of the tripod head can be adjusted later with this leg independently of the length of the other legs (see diagram below).

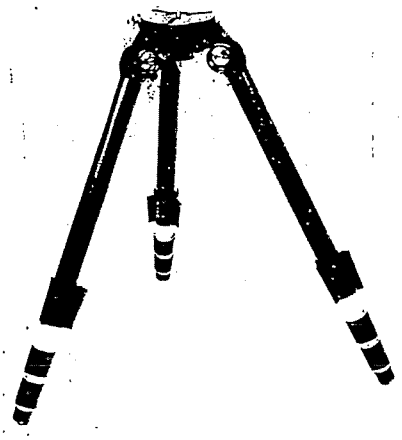


- Install tripod chassis.
  If necessary, install DRS according to instructions in 4.2 and ZSE as instructed in 5.2.
- Set up tripod chassis exactly parallel to the traffic lane(s):

  * Measure distance from tripod chassis to edge of road. Since the sighting line is laterally displaced 12.5 cm from the centre of the tripod, this dimensions must be taken into account during further setting up of the tripod chassis.

  * Set up position-finding rod held vertically at a distance of approx. 10 m with the distance from the edge of the road considered above.

  * Align chassis to the position-finding rod with the aid of the sight.
- Tighten clamping screw (no 1 in illustration on next page) with appropriate key.
- The lateral inclination of the tripod chassis is compensated by means of the spirit level on top by drawing out or shortening one of the two tripod side legs (2 or 3 in drawing on page 7-24).
- The longitudinal inclination of the tripod chassis is then set parallel to the road by drawing out or shortening of the tripod leg (1 in drawing on page 7-24) set parallel to the road axis.
- Then the lateral inclination is first checked and corrected if necessary, followed by the longitudinal inclination and finally the alignment parallel to the edge of the road.







# 8. Operating the camera unit

The system can be operated with the following camera units:

- Camera unit FT-2 (Jacknau).

- MultiScript (Robot).

## 8.1 Camera unit FT-2 (Jacknau)

### 8.1.1 Preparation of camera unit

- Insert film

### 8.1.2 Mounting of camera unit

#### 8.1.2.1 Vehicle mounting

- Insert camera unit and connect control cable.
- Set up camera unit corresponding to camber of road and engage camera angle according to direction of measurement. (16° to direction of travel for both directions of measurement).
- Clean inside and outside of windscreen in the exposure area.

#### 8.1.2.2 Tripod operation

- Mount camera unit on tripod chassis and connect control cable if not already connected.
- Engage camera angle according to direction of measurement (19° for both directions).
- In bad weather mount rain protection and filter if necessary.

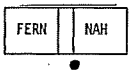




### 8.1.3 Adjusting the camera

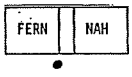
- Remove lens cap and fit lens hood if necessary.
- Set exposure
- Set distance

For measurements on country roads (or on narrower roads in towns) the distance should be set as follows:




*

For measurements on multilane highways (motorways, etc.) the distance should be set as follows:




*

Retrofitting of units with delivery date prior to Sept. 1986 with this distance scale is possible.

* "FERN" = Long
"NAH" = Short.

### 8.1.4 Use of a polarizing filter

During the daytime, the reflection of sunlight on wind-screens can be effectively reduced by mounting a polarizing filter on the camera lens. This enables the photography of car drivers without the use of a flash with red filter.

Before mounting the polarizing filter, its correct orientation has to be determined as follows:

- observe a vehicle in the position where it is normally photographed through the polarizing filter.
- by rotating the polarizing filter, find the orientation in which it suppresses the sunlight reflections on the windscreen most effectively.
- mark the top of the polarizing filter in this orientation (with pencil or feltpen).
- screw the polarizing filter to the camera lens.
- rotate the polarizing filter until the previously made mark points upwards.

**CAUTION:** The polarizing filter absorbs about 50% of the incident light. The diaphragm has to be adjusted accordingly.



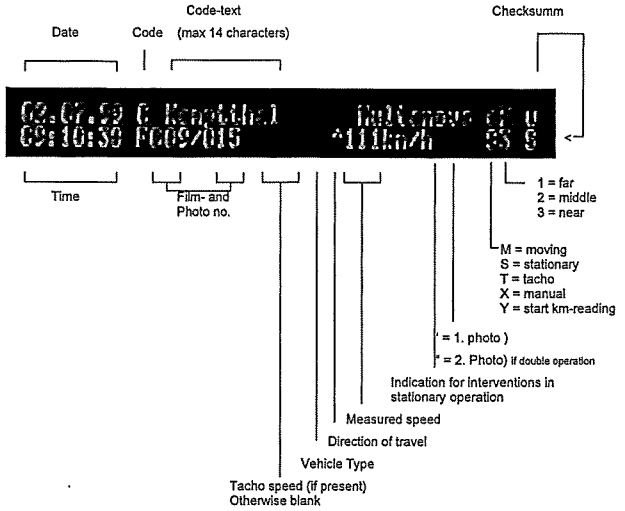


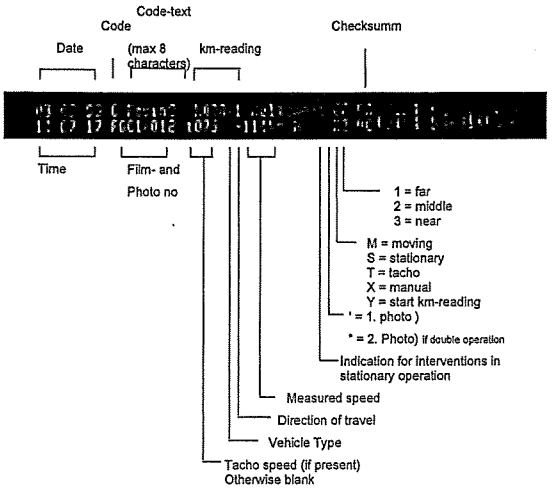
### 8.1.5 Data bas

The camera unit FT-2 data display has two lines with 40 characters at the top edge of the picture.

Example:

Photo with data display from a radar measurement in moving operation:






To check the correct function of the data display, the test photos at the beginning of each new film show the following data:

In the upper line: 39 characters (numbers /special characters / letters) plus at last (40.) the check character five.

In the lower line: All present speed limit values

### 8.1.6 Checking the data display

(Patent pending)

Each of the two display lines on the photo contains an additional character at the end, with which at the completeness of the display can be checked.

The ASCII table (see below) familiar from data processing assigns a specific numerical value between 0 and 127 to each character which can be displayed. The display electronics adds the numerical values of all characters in a display line (without check character) and divides the sum by 128. A specific character then corresponds in turn to the remainder no longer divisible to an integral number (this lies between 0 and 127). This is appended to the display line as check character.

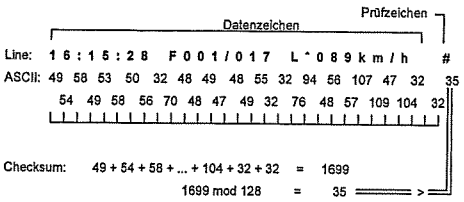
All characters, also blanks (ASCII 32), contribute towards the sum.

Example of the method of check character formation:

(Represented by a part of a display line)








("mod 128": formation of the remainder no longer divisible by 128)

Any viewer of a photo can verify the formation of the check character using the ASCII table. If the character obtained in this way does not correspond with the check character displayed, the display is not valid.

ASCII-Tabel

| Character | Value | Character | Value | Character | Value | Character | Value |
|---|---|---|---|---|---|---|---|
| | 00 | | 16 | (empty) | 32 | 0 | 48 |
| | 01 | | 17 | ! | 33 | 1 | 49 |
| | 02 | | 18 | " | 34 | 2 | 50 |
| | 03 | | 19 | # | 35 | 3 | 51 |
| | 04 | | 20 | $ | 36 | 4 | 52 |
| | 05 | | 21 | % | 37 | 5 | 53 |
| | 06 | | 22 | & | 38 | 6 | 54 |
| | 07 | | 23 | ' | 39 | 7 | 55 |
| | 08 | | 24 | ( | 40 | 8 | 56 |
| | 09 | | 25 | ) | 41 | 9 | 57 |
| | 10 | | 26 | * | 42 | : | 58 |
| | 11 | | 27 | + | 43 | ; | 59 |
| | 12 | | 28 | , | 44 | < | 60 |
| | 13 | | 29 | - | 45 | = | 61 |
| | 14 | | 30 | . | 46 | > | 62 |
| | 15 | | 31 | / | 47 | ? | 63 |

ASCII 00 bis 31: Sonderzeichen

| Character | Value | Character | Value | Character | Value | Character | Value |
|---|---|---|---|---|---|---|---|
| @ | 64 | P | 80 | ` | 96 | p | 112 |
| A | 65 | Q | 81 | a | 97 | q | 113 |
| B | 66 | R | 82 | b | 98 | r | 114 |
| C | 67 | S | 83 | c | 99 | s | 115 |
| D | 68 | T | 84 | d | 100 | t | 116 |
| E | 69 | U | 85 | e | 101 | u | 117 |
| F | 70 | V | 86 | f | 102 | v | 118 |
| G | 71 | W | 87 | g | 103 | w | 119 |
| H | 72 | X | 88 | h | 104 | x | 120 |
| I | 73 | Y | 89 | i | 105 | y | 121 |
| J | 74 | Z | 90 | j | 106 | z | 122 |
| K | 75 | [ | 91 | k | 107 | { | 123 |
| L | 76 | \ | 92 | l | 108 | \| | 124 |
| M | 77 | ] | 93 | m | 109 | } | 125 |
| N | 78 | ^ | 94 | n | 110 | → | 126 |
| O | 79 | _ | 95 | o | 111 | | 127 |





## 8.2 FT/ 6FR camera unit (ROBOT)

### 8.2.1 About these operating instructions

The purpose of these operating instructions is to make it easy for the user to familiarise himself or herself with the photo unit **MultiScript** and to enable him or her to use it in the areas of application for which it is intended.

These operating instructions contain important hints and information on how to use the photo unit in a safe, professional and economic manner. Observing these operating instructions will help to avoid dangers, reduce repair costs and down-times and increase the lifetime of the unit.

These operating instructions should be kept available at the place the photo unit is used at all times. These operating instructions should be read and applied by everyone who installs, operates or services the photo unit **MultiScript**.

Read the section on safety measures for your own safety. Follow all the instructions precisely so that you do not endanger yourself and/or other persons and so that damage is not done to the photo unit.

The photo unit **MultiScript** has been manufactured in accordance with the most modern methods and using highest quality components. Careful intermediate checks and a quality management system certified in accordance with DIN EN ISO 9001 ensure optimum quality of execution of the system.

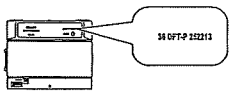
How to integrate the equipment into other products - such as the measuring system Radar 6F - see the appendix which is added to these operating instructions.

### 8.2.2 Type plates

To identify an individual unit precisely, you will find the model designation and serial number on the housing of each individual unit.

Before ordering spare parts and/or accessories, note down the model designation and serial number for the unit in question. The Multanova customer service needs this information and will also be able to answer your queries faster.

Examples of type plates with model designation and serial number:




*Serial number of the motor recorder*





## 8.3 Safety measures

### 8.3.1 Operator`s safety

The photo unit **MultiScript** has been designed and built in accordance with the state of the art and the recognised technical safety rules. Nevertheless hazards can arise for the user if the unit is used improperly.

As a user of the photo unit, you should have read and understood these operating instructions before commencing to use it. In particular you should observe the following safety instructions:

- When using the unit, take care that you will not be endangered by moving traffic when installing or dismantling the unit or when aligning it.
- To connect your individual components, only use original cables from **Multanova AG.** Only these cables will provide the necessary personal safety.
- Carry out only the care and maintenance work described in these operating instructions. All other work carried out on the photo unit can endanger persons or cause damage to the unit.

**Avoidance of material damage**

- Switch off the photo unit and disconnect it from the circuit before connecting or disconnecting cables.
- The whole equipment must be switched off before you place the camera on the base of the script-unit.
- The whole equipment must be switched off as well before you put in a film or magazine.

## 8.4 Description of the product

**General features**

The photo unit **MultiScript** consists of an electronic unit, a **ROBOT** motor recorder and a special objective. There also is the choice to insert a film magazine instead of the back of the camera in order to use long films (see chapter ***Installation of a film-magazine, p. 8-36***).

The photographic proof bound up with the measuring value is a clear documentation of the situation concerning the safety of traffic. The photo unit **MultiScript** presents an efficient equipment which can be run connected to many different measuring systems. It can be integrated as a component into different systems.

### Application possibilities

The unit allows an automatic exposure of films. In addition to the photograph itself the unit writes down information concerning the photo taken onto the upper border of the film. These information e.g. may look like this:

A combination of the photo unit **MultiScript** and other systems is possible via different ports (see chapter *Ports, p. 8-39*). How to integrate the equipment into your existing system can be read in the appendix which is added to these operating instructions.

### Scope of supplies and accessories

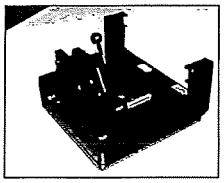
The standard scope of supplies of the photo unit **MultiScript** comprises the following items:

- **ROBOT** motor recorder
- electronic unit (containing operating software and disk)
- Objectives
- NR-Cassette

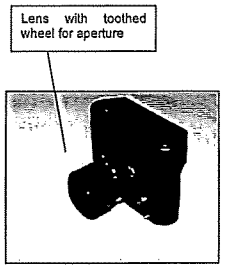
The following accessories are optional:

- 30-m-film-magazine

### Illustrations



*electronic unit*




*ROBOT motor recorder*

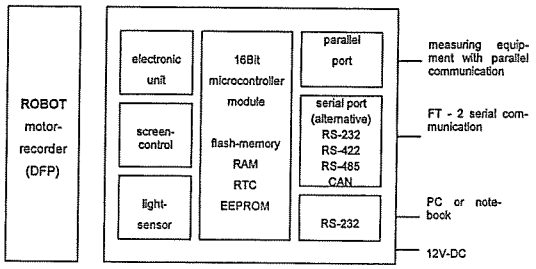




### Function and structure

The ROBOT motor recorder is controlled by a processor-system within the electronic unit. This system also is responsible for the information which is written down onto the border of the film, while it is transported to the next position. The electronic unit also controls the screen adjustment with the help of a sensor.

The different components are shown in the diagram below:




## 8.5 Setting to work

### 8.5.1 Preparation of the motor recorder

#### 8.5.1.1 Setting up the objective

First of all the objective has to be set up to the **ROBOT** motor recorder. Therefor you must put the objective to the opening in the middle front of the motor recorder, so that the two red points exactly are above each other. Then turn around the objective clockwise to the stroke.

Please make sure that only objectives are used which especially are coordinated to the photo unit **MultiScript**. If you would like to use another **ROBOT**-objective, modifications would be necessary which only can be carried out by **ROBOT**.





#### 8.5.1.2 Choice of film-material

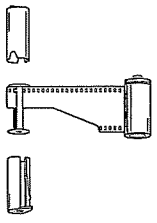
The **ROBOT** motor recorder can be used with a NR-cassette (film cartridge) or a film magazine. When using a NR-cassette with a maximum of 36 exposures the camera is closed with the camera back. The film magazine with a capacity of 800 exposures is mounted directly on the back of the open camera body and seals the body in an airtight way.

**Inserting a NR-cassette**

In conventional cameras a new film is threaded in an integrated take-up spool and wound back at the end of the film. The **ROBOT** camera uses a take-up cassette which is impervious to light and can be immediately removed at the end of the film.

Proceed as follows:

- Pull the grooved lock on the right of the camera back, swing the back open to approx. 90° and unhinge it.
- Push down the slider (3) to unlock the carrier lever and remove empty take-up cassette.
- Pull the two inner shells of the three-part take-up cassette apart. The spool is in the shell.
- Remove the spool.
- Pull the film leader out of the new film cartridge and place it under the metal strip of the spool.
- Hook the film in the second perforation and bend the film end towards the film cartridge. The film must not slip from the spool during take-up.
- Re-insert spool and film into the lower shell so that the film passes through the slot with the felt light trap.



- Slip upper shell over the lower so that the film runs through the slot of the shell.

**NOTE**

Join the two shells by turning them, otherwise the felt light trap may be damaged. This may later cause a film exposure and render all exposures useless! The self-adhesive felt light traps wear off after a while and must then be replaced.

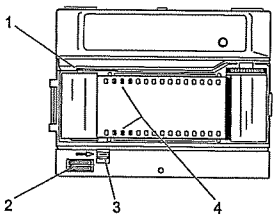
- Push down the slider (3) to unlock the carrier pin on the camera and insert the take-up cassette into the left chamber of the camera. The two upper guide pins of the cassette (1) must slide one after the other into the groove in the chamber.
- Turn take-up wheel (2) shortly to the direction indicated by the arrow until the film lies taut and the teeth of





the film transport roller engage in the film perforation (4).

- Hinge camera back at the left of the body and close the back. A snap must be audible.




**Installation of a film-magazine**

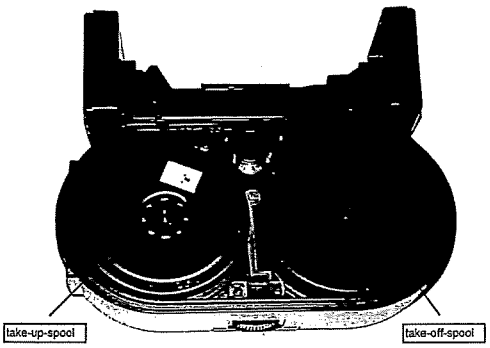
The film-magazine can be charged with metered film material and with standard film spools up to a length of 30 m. If using standard film spools which only have a core without flanges, the cores should be removed and a **ROBOT**-take-up-spool be used instead.

The **ROBOT** take-up-spool is equipped with a stop spring at the lower flange serving as a brake and avoiding take-off. The upper flange can be removed so that the film spool can easily be inserted.

Proceed as follows:

- Lift handles of magazine cover and turn them to the left. Lift off magazine cover.
- Remove both spools from the magazine.
- Cut the film leader diagonally on both sides to facilitate threading in.

Daylight loading cartridges may be inserted under normal light although they should not be exposed to strong sunlight. Normal films must be inserted in the darkroom. Special red-sensitive films must be inserted in complete darkness. Do not fix the metered film material to the take-off-spool! Otherwise no automatic turn-off at the end of the film will take place.




- Remove upper flange of feeding spool and place unexposed film spool on the spool axle. The spool must run clockwise while the film is unwinding.
- Pull red film feeler lever slightly back from the spool until it engages.
- Place upper flange onto the take-up-spool and ensure that the flange firmly fits on the square of the axle.
- Thread in the film end in the magazine cover. For this purpose turn the red film transport wheel outside the magazine in the direction of the arrow until the film is long enough to be fastened to the axle of the take-up-spool using adhesive tape.
- Fasten film end to the axle of the take-up-spool using a piece of adhesive tape.
- Place the take-up-spool on the axle and turn the spool by hand to tighten the film properly. The spool must turn clockwise during winding up the film.

Only two fingers may fit between the film strip protruding from the magazine and the magazine. Ensure that the mat side of the film material faces the camera.

- Lift the film feeler lever slightly until it engages to bring it into contact with the film reel.
- Replace magazine cover on magazine, turn handles of the magazine cover to the right and press them down. The magazine now is locked impervious to light.
- Place magazine between the clamps and re-insert it into the photo unit.





### Setting up the motor recorder onto the electronic unit

Before you set up the motor recorder onto the electronic unit make sure that the lighting-port between camera and electronic unit is not dirty. Clean this port if the occasion arises, for the exposure of the data onto the film may become irregular.

Turn up the lever into the highest position and shove the motor recorder through the opening. Now turn down the lever again.

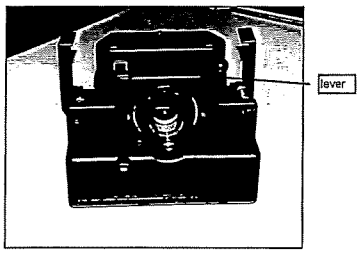



*photo unit MultiScript*

Six contacts (invisible on the illustration) now attend to the connection of the electronic unit and the **ROBOT** motor recorder..

The photo unit **MultiScript** now can be controlled via different ports (see chapter **ports**, *p. 8-39* ).

### Connection of photo unit and controlling unit

The photo unit **MultiScript** now has to be connected to the controlling unit of your system. Therefore ou must fix the port-cable of your system to the parallel or serial port of the photo unit (for details see the appendix which is added to these operating instructions).

Make sure that the whole equipment is switched off before you connect any units.





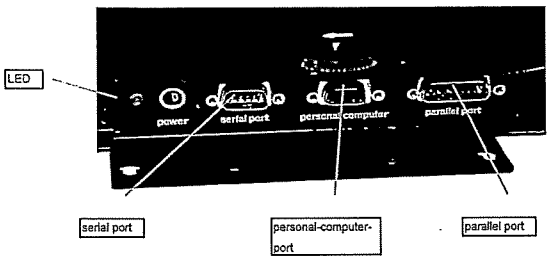
### Starting the whole equipment

Before starting the whole equipment make sure that you have installed the right objective and that the motor recorder is set and barred correctly. You should check all connected ports, too.

After the whole equipment has been switched on, first of all the objective is moved to both sides. The LED on the back of the unit is glowing red meanwhile. Wait till the LED turns green and shows that it is ready for photographing.

## 8.6 Ports

The function of the different ports of the photo unit exclusively is determined by the implemented software of the unit. Some ports - depending on the used software - can be inactive, too. Detailed hints on this topic you find within the appendix which is added to these directions of use.




### Parallel port

The parallel port supports the photo unit **MultiScript** in connection with measuring systems of ROBOT FOTO UND ELECTRONIC GMBH. The TRAFFIPHOT III-SR and the speedophot C rank among them. The parallel port consists of a 25-pin plug, which is located on the right back of the photo unit. (see chapter technical details for more information)

### Serial port

The serial port is used for connecting the photo unit **MultiScript** to the 6F radar system. The following physical ports are supported:

- Serial port RS-232,
- serial port RS-422,
- serial port RS-485 and





- CAN-Bus-port.

The serial port consists of a 9-ping plug, which is located on the left back of the photo unit.

### Personal-computer-port

A personal computer or a notebook can be connected to the photo unit via the computer-port. This port generally is a RS-232-port, so that a computer or a notebook directly can be connected to the unit.

Depending on the used software, the the computer or the notebook can be used for transmitting data into the photo unit **MultiScript**.

> *Example:*
> *If the photo unit is connected to the* ***Multanova 6F – 2 Radar*** *measuring system, the system uses the storeroom of the photo unit. Depending on the code for the location that was stored in the (see operations instructions* ***Multanova 6F – 2 Radar) MultiScript****, the photo unit writes down this data onto the upper border of the film. If via the computer-port different characters were loaded into the photo unit before, the output on the film is possible in varying characters (e.g. Chinese or Russian ones).*

## 8.7 Care and maintenance

**Note!**

Servicing and repairs may only be carried out by the customer service department of **Multanova** or an authorized service workshop.

The products of **ROBOT** require no maintenance as such in general. Since however they are used under rough conditions in road traffic and must be frequently assembled and dismantled, you should carry out the following work at regular intervals in order to avoid possible faults.

Protect all plugs, sockets and openings in the housing from contamination and to prevent extraneous elements getting into them.

Do not put any part of the unit underwater.

The photo unit **MultiScript** can not be exposed to rain and high humidity. Please also take into consideration that no sand or other foreign substances can penetrate the into the equipment.

Wipe off units which get dirty with a dry cloth and remove extraneous elements with a brush or compressed air.

If the base of the housing gets dirty, wipe it off with a dry cloth.

## 8.8 Faults - causes and remedies

| *Fault:* | *possible causes:* |
|---|---|
| LED does not glow | *Voltage supply is missing or defective.*<br>*In the case of use of the parallel interface: Interface cable not attached.*<br>*In the case of use of the serial Interface: Voltage supply not put into the socket „power".*<br>*Defect photo unit.* |
| Screen of the objective does not close or open completely | *Objective with uncorrectly installed gear rim is in use. Conventional ROBOT objectives may be used after renewed assembly of the gear rim for the photo unit only.* |
| No photographing | *Motor recorder is not put or locked correctly.* |
| Data line is irregular | *Light-interface at the bottom of the motor recorder or at the electronic unit is dirty.* |
| Data line too bright / too dark | *Film development was not executed correctly.*<br>*Adjust the brightness at the measuring system in use.* |
| Quality of the photos is insufficient | *Please contact our technical customer service, for a general analysis of the entire photo process - incl. development of the films - is necessary.* |

## 8.9 Technical data

| | |
|---|---|
| electronic unit | *diagram-able electronic unit with 584*16 points and optics* |
| | *automatic screen-control by integratd lightsensor* |
| | *microcontroller module 16 bit, 128 KB flash, 64 KB RAM, EEPROM* |
| | *parallel port* |
| | *serial port* |
| | *serial port,alternatively RS-232/485/422/CAN* |
| | *supply voltage 10 bis 15 V* |
| | *power input 400 mA, input peak up to 5 A during photographing* |
| ROBOT motor recorder | *model 36 DFP* |
| | *optional film-magazine* |



### 8.9.1 Allocation of ports

Allocation of the 9-pin Sub-MIN-D-plug of the serial port using a serial-port-module RS-422:

| PIN | Allocation | PIN | Allocation |
|---|---|---|---|
| 1 | *RS422 Tx -* | 6 | *RS422 Tx +* |
| 2 | | 7 | *(Output Sync1)* |
| 3 | | 8 | *(Output Sync2)* |
| 4 | *RS422 Rx -* | 9 | *RS422 Rx +* |
| 5 | | | |

Allocation of the 9-pin Sub-MIN-D-plug of the serial port using a serial-port-module RS-232:





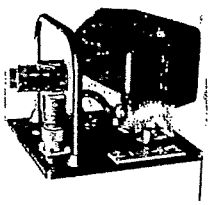


# 9. Operating the flash units

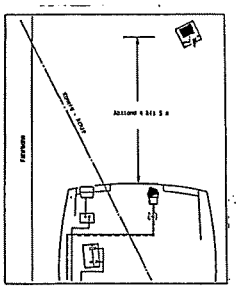
## 9.1 Flash unit MB- 2E (vehicle mounting)

Set flash light according to measuring arrangement (measurement from right or left side of road).

It may be necessary to loosen the fiing screws slightly for this purpose.



For the photography of reflective number plates we recommend additional use of an MB-2A with attachable, optical remote release.



The MB-2A with attached release is placed approx. 4 - 5 m in front of the vehicle and aligned so that the measured vehicle is illuminated at the side from the rear.

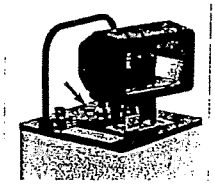
The flash light of the MB-2E (on vehicle) is for this application aligned parallel to the road and slightly downwards.

In this way the measured vehicle is fully illuminated without disturbing reflections from the reflective number plate



## 9.2 Flash unit MB- 2A

If there is no MB-2E installed in the measuring vehicle, the MB-2A is placed in front of the vehicle and directed in the general direction of measurement (note photo position).

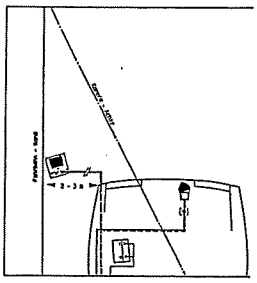


With tripod operation the flash unit is placed beside the tripod and pointed in the general direction of measurement.

Connect control cable.

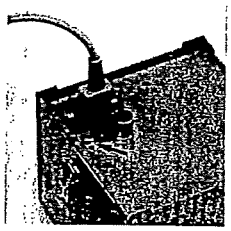
Check flash release by pressing red button

With reflective number plates the flash unit MB-2A is preferably placed 2- 3 m aside from the tripod (or vehicle) in the direction of the lane being monitored.



⚠ WARNING

- After using the MB-2A and/or if it is not used for a prolonged period, the battery pack should be disconnected from the flash unit and charged from the mains (220 V) via the cable supplied.
- Charge battery until signal lamp changes from red to green. The battery cannot overcharge and can therefore be left connected to the mains supply for a prolonged period.
- If the attachable, optical flash release is used, it should be removed from the plug when the MB-2A is not in use. The flash unit is in operation with the release attached (converter active) and the battery can discharge slowly, but completely
- Separate batteries should be treated according to the instructions of their manufacturer.



## 9.3 Front photography with red flash

**Equipment required**

- MB-2A fitted with 4 flash capacitors (340 WS) and preferably provided with the special flash light for front photography. This flash light is fitted with a red filter with wavelength 665 nm (RG 665).

  If the standard light is used, the red filter supplied for this light must be fitted.
- Daytime: red filter RG 665 in front of camera lens.

  At Night: no red filter in front of camera lens.
- Tripod with carrier for flash unit MB-2A
- Film material: Kodak RAR 2479 and Kodak 90033.

**Setting up equipment**

- Set up flash unit as near as possible to the photo position of the vehicles to be measured.
- Set up flash tripod so that the light is approx. 1 m above the road level.

  Direct light at the photo position of the vehicles to be measured.

**Operation**

- Check whether flash light is provided with red filter !
- The camera red filter must only be attached during daylight, to reduce reflections on the windscreen.
- At twilight and at night the red filter should be removed from the camera lens, so that the flash is not attenuated unnecessarily.
- Set aperture of camera lens to 4 or 5.6 (during day and night).
- Setting of photo data on BG:

| flash | ASA |
|---|---|
| 100 % | 3200 |

- For the first shots check whether the flash light is well oriented (visual check during the day possible with red filter).

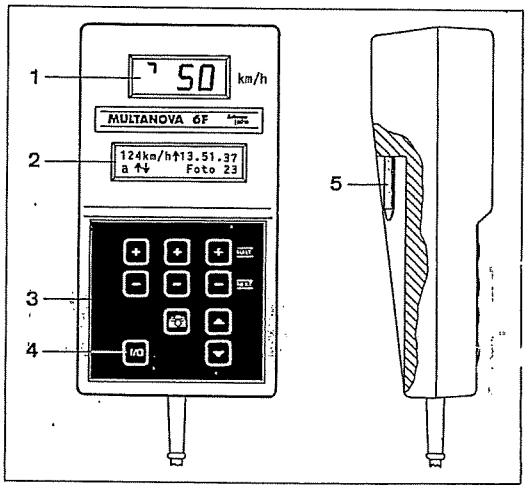
**Film developing**

| | |
|---|---|
| Important: | Owing to its increased red sensitivity, the film must be processed in absolute darkness. |
| Developing: | Preferably in MICROPHEN (Ilford) for 10 minutes at 21°C. |
| Movement: | Continuously for the first minute, then every 30 seconds for approx. 10 seconds |
| Fixing: | With standard commercial fixing bath. |
| Washing: | As for all thin-film materials. |





## 10. Operating unit BG




1 Illuminated LCD- display for speed and direction of travel
2 Illuminated alphanumeric LCD- display for operation and control
3 Membrane keyboard for operation
4 Main switch for complete system
5 Socket pins for fixing operating unit





## 11. Switching on and Checking

Connect BG to vehicle installation or to tripod chassis. Before measuring can be started, all setting lines must be called up on the BG and the required data checked or set.

The data within the individual lines can be adjusted with the keys [+] and [-].

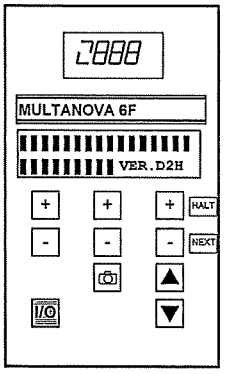
The data is moved one position by brief depression. If depressed longer, most data is shifted rapidly several positions or digits and only stop when the key is released.

The next line is called with the [▼] key and the previous line with the [▲] key.

If data was altered in a line, the new data is only entered after a change of line (exception: time of day) .

The functions of the remaining keys are described on the following pages.

**Segment test**




The segment test continues while the I/O key remains pressed. All segments of the speed display and all dots of the alphanumeric display can be checked.

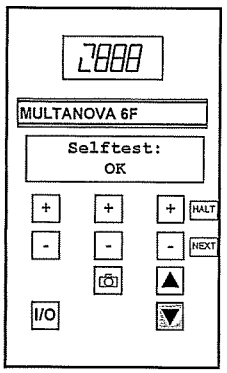
Exception: at bottom right the number of the program version in the unit is shown.

After releasing the key the unit indicates the result of the quartz test performed automatically each time after switching on.



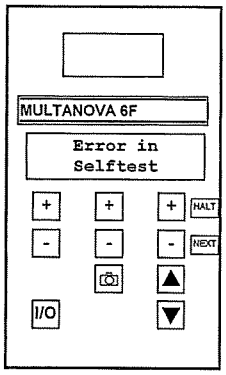


**Self test**




The display will show the message "Selftest OK" if the automatically performed quartz test passes after switching "on" the system

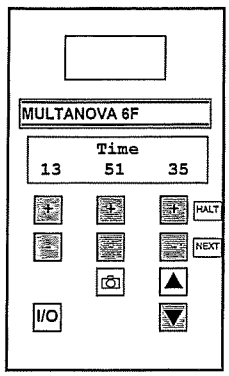
**Selftest failure**




In the case of a selftest failure all functions will be blocked.

Switch "OFF" the system and bring the equipment to nearest service centre for testing.

### Time-of-day



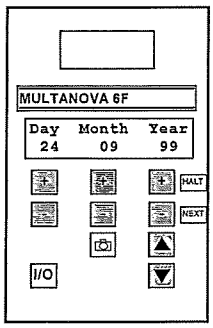

Check hours and minutes and set if necessary with (+) or (-) keys.

After setting, start clock by pressing (+) or (-) key below the seconds display.

The clock also continues to run after switching off the unit.

**Caution:** a new time-of-day entered is only accepted by the unit after pressing one of the (+) or (-) keys below the seconds display.

### Date



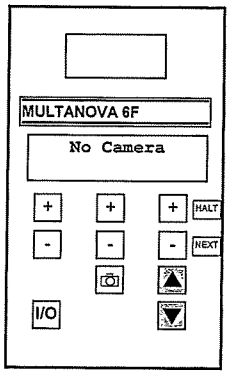

Check the day, month and year and set if necessary with the (+) or (-) key. Impossible data are not accepted by the unit.

The data entered also remain stored after the unit is switched off.





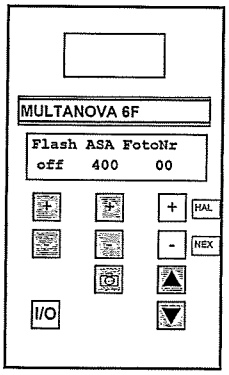
### No camera




If no camera unit is connected the display will show the message **"no camera"** instead of the "photo-data" line.

Switch "OFF" the system and connect the camera.

### Photo-data



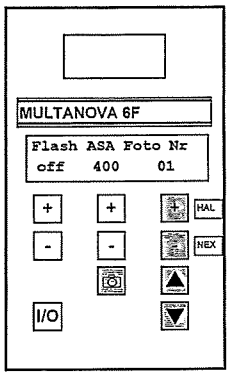

Flash off = flash unit switched off
50% = half flash power
100% = full flash power
- Insert new film
- Set photo No. to 00 in "Photo data" line
- Press camera key (test photo)
- Proceed to "Measuring Operation" line

Colour: when using colour film





### Photo counter

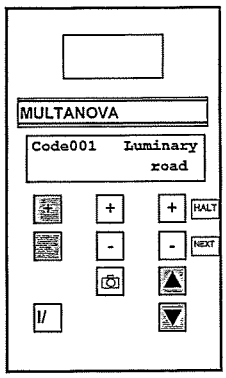



If a new film has been inserted, set Photo No. to 00 by pressing (+) and (-) keys simultaneously. Then press camera key.

The camera triggers 3 times in rapid succession. The photo counter shows 01.

The first two photos are for feeding the exposed start of the film. The third shot shows all LED-indications as 8 and serves as evidence that the unit was in order.

### Code

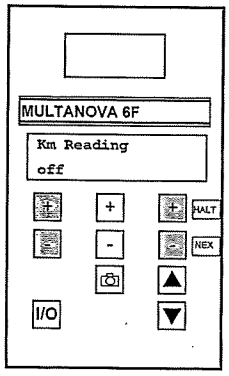



The left (+) and (-) keys are used to select the desired code (road name). The information is then stored after paging up or down to the next page.





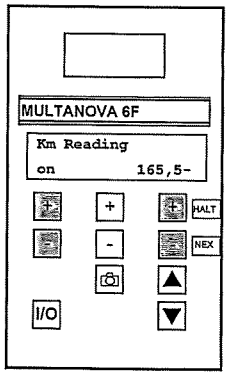
### Km-Reading "off"




The operator can decide whether a km-reading is required. This option is usually used when doing moving radar measurements.

The km-reading is "on" or "off" by pressing the left (+) or (-) key.

### Km-reading "on"

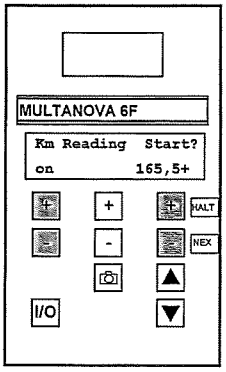



If "on" is selected, the km-reading last stored appears at the lower right end of the display with the corresponding sign "+" or "-".

"+" sign: the km-reading increases as the carrier vehicle moves along the road.

"-" sign: the km-reading decreases as the carrier vehicle moves along the road.

### Km-reading "Start"



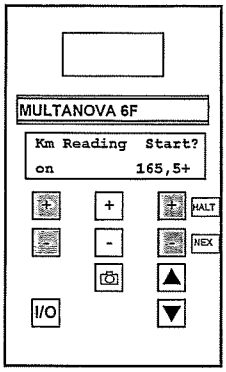

The km-reading is set with the right (+) or (-) keys.

The (+) key increases the km-reading displayed and sets the "+" sign for the counting direction. The (-) key decreases the km-reading and sets the "-" sign for the counting direction.

When one of the keys is pressed, the value of the km-reading changes and "Start?" appears.

N.B.: If one of the keys is pressed for several seconds, the counting speed increases to permit the desired value to be reached more quickly.

### Km-Reading active

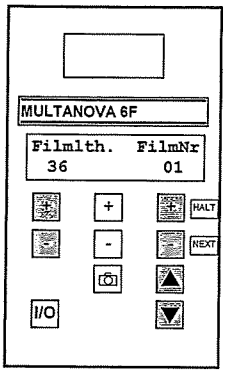



The set value is definitely accepted by pressing the two centre keys (+) and (-) simultaneously.





### Film length and film number

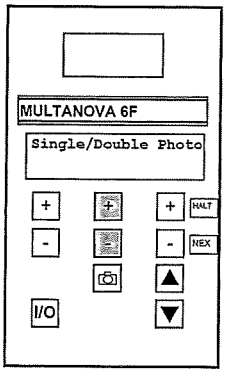



Enter the number of possible photos corresponding to the length of the film inserted.

Adjustable from 10 to 99 shots in single steps, from 100 to 990 shots in steps of 10.

The line "Film length" is bypassed if a camera unit is no present.

### Single/Double Photo



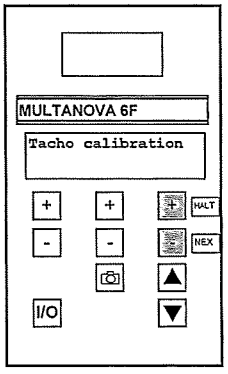

The radar system can be set to take either Single or Double photo's.

The middle "+" and (-) keys are used to select the desired functions.



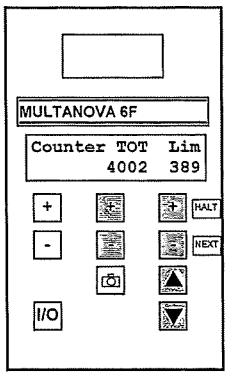


### Tacho calibration




See chapter 15.3 Calibration check of the tacho measurement and 15.4 Operating mode.

### Traffic Counter




**Total:** All vehicles detected are counted.

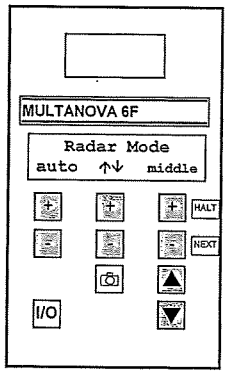
**Lim:** All vehicles exceeding the set speed limit are counted (cars and trucks).

Resetting counters to 0 is done by Pressing the (+) and (-) keys simultaneously.





### Mode of operation




A = automatic operation

H = manual operation

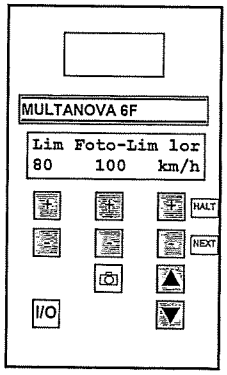
↑↓ = active direction of measurement

Photo = last photo No.

The photo number is not displayed if no camera unit is present.

Sensitivity = near / middle / far (see also page 13-83)

### Limit values for trucks




Setting of speed limit for trucks (lorries) only possible for receding traffic (mph).

Lim: Limit value for acoustic signal and limit value counter.

Foto Lim: Limit value from which camera is actuated. The speed limit is adjustable in steps of 1 km/h (mph) from 25 to 249 km/h (mph).