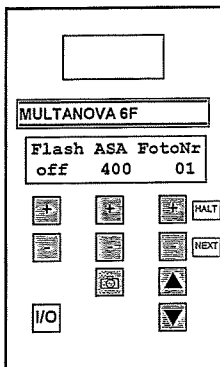


Photo data



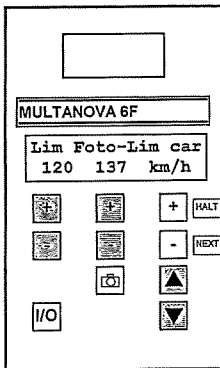
For ease of operation, this line is repeated here again.

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 is in order.

Privat car speed limits



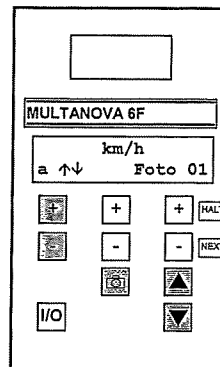
Lim: Limit value for acoustic signal and limit value counter.

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).

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Measuring operation



The unit only measures in this line.

A = automatic operation

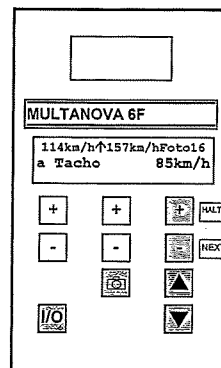
(H = manual operation)

↑↓ = active direction of measurement

Foto = last photo No.

The photo number is only displayed if camera unit is present.

Moving operation mode



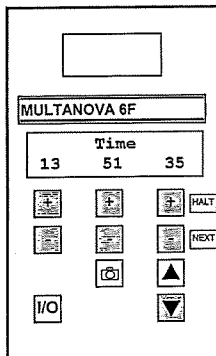
114 km/h: least measured speed

157 km/h: speed of lasst violation

85 km/h: speed of the measuring vehicle

a: Indication for automatic operation

Time



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.

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12. Measuring operation

When the necessary checks have been completed and the required data set, the MULTANOVA 6F is ready for operation. At the start of a measurement the old measured value is deleted before the new value is displayed.

The symbol — appears for a cancellation.

If the private car speed limit is exceeded, a brief low beep is heard.

If the speed limit for trucks is exceeded by a truck in the receding traffic, a long low beep sounds when the vehicle leaves the radar zone. The display is briefly blanked after a truck, detected exceeding the speed limit, leaves the radar zone.

After exceeding the photo limit value (for cars or for trucks in the receding traffic) the camera is operated

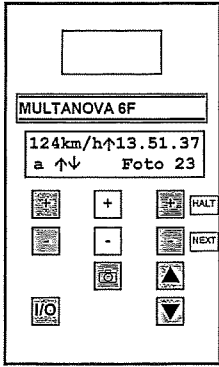
- for approaching traffic immediately after entry of the vehicle in the radar zone,
- for receding traffic normally shortly after the vehicle leaves the radar zone.

A brief, high-pitched beep sounds simultaneously.

Since for approaching traffic the camera is operated shortly after the vehicle enters the radar zone, but the data are only projected after the vehicle has left, a delay is apparent between actuation of the shutter and film feed.

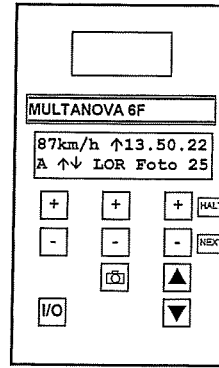
For receding traffic the data projection and film feed take place immediately after operation of the shutter.

Example of a receding measurement



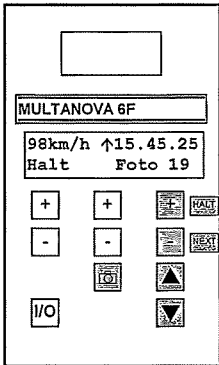
Speed with arrow for direction of travel (example: receding)
 Upper line:
 Data of last violation:
 - speed
 - direction of travel
 - time-of-day
 Lower line:
 A = automatic operation
 ↓↑ = active direction of measurement, can be changed during measuring operation with the (+) or (-) key
 Photo = last photo no. (0-999)

Measuring of a truck A



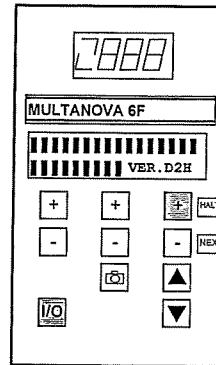
If a truck is measured above the speed limit in receding traffic, the symbol 'lor' appears in the display before the photo No.

Retain last measured value



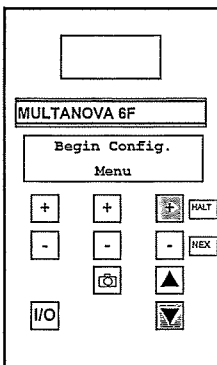
HALT key depressed = unit inactive for further measurements.
 NEXT key depressed = unit active until next violation of car or truck speed limit. The unit then returns to the HALT condition until the NEXT key is again depressed.

Configuration menu



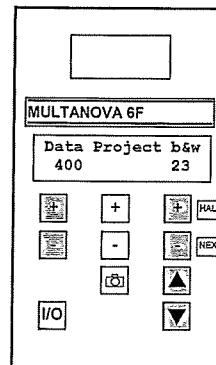
In order to enter the configuration menu press the "HALT" key while switching "ON" the unit.

Begin configuration menu



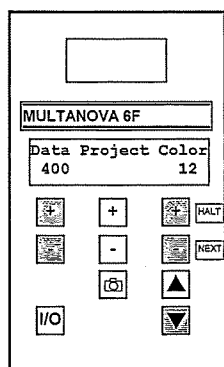
The unit will activate the configuration menu as soon as the I/O key is released whilst continuing to hold down (+) "HALT" key. The display will now show "Begin config. Menu"
 Press the page down key to continue to the next step.

Set b/w film sensitivity for the required film type



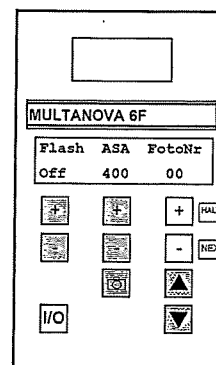
The optimum adjustment for the brightness of the data readout is set here and depends on the b/w film material used.
 The ASA value of the b/w film to be used is set first and then the display value can be set according to the results of the data display tests done with the film.
 The default value is always set to 15.

Set colour film sensitivity for the required film type



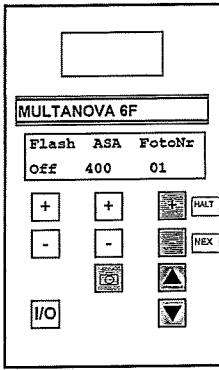
The optimum adjustment for the brightness of the data readout is set here and depends on the colour film material used.
 The ASA value of the colour film to be used is set first and then the display value can be set according to the results of the data display tests done with the film.
 The default value is always set to 15.

Flash and film sensitivity



Flash off = flash unit switched off
 50% = half flash power
 100% = full flash power
 50%A = automatic (aperture control) half flash power
 100%A = automatic (aperture control) full flash power
 Set film sensitivity by pressing the middle two (+) or (-) key.
 - e.g. ASA 400 for b/w films
 - e.g. ASA 400C for colour films

Photo counter

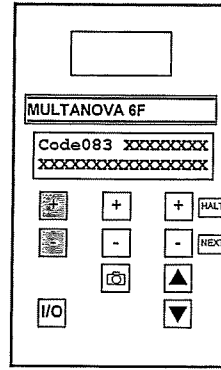


If a new film has been inserted, set Photo No. To 00 by pressing (+) and (-) keys simultaneously. Then press camera key.

The camera operates three times in rapid succession. The photo counter shows 01.

The three pictures are required in order to transport the exposed part of the film. At the same time ASCII characters are superimposed on to the top data line and on the second data line the pre-set speed limits for cars and trucks. This information serves as evidence that the camera unit was in order.

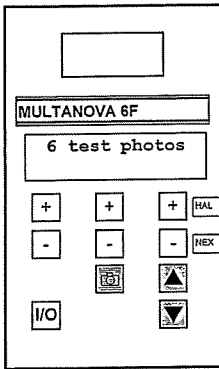
Setting of the location codes



With the use of the left (+) or (-) key page through the location codes until the required position has been reached.

This can either be a new location code or previously used location code.

Data display test

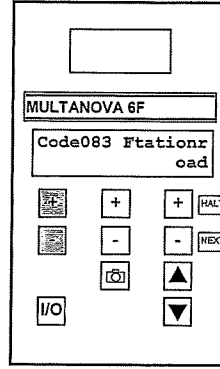


Press * * key.

The camera will take six test pictures, showing data brightness values from 00 to 29.

The best readable value is chosen and then entered under "Set film sensitivity"

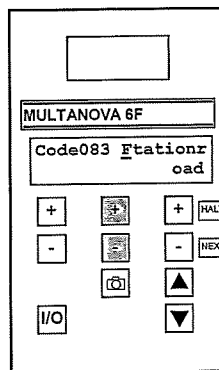
Setting of the location codes



With the use of the left (+) or (-) key page through the location codes until the required position has been reached.

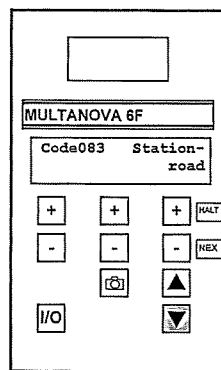
This can either be a new location code or previously used location code.

Positioning of the cursor



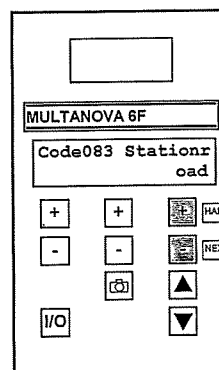
After a location code has been chosen (e.g. location code 83), move the cursor position with the middle (+) or (-) key to the character to be set.

Setting of the location codes



After adjusting the location codes press the page down key to store the data.

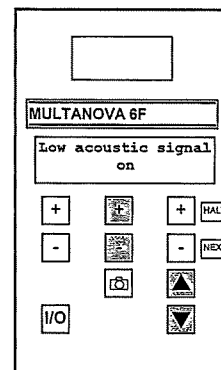
Adjustment of the character



After the cursor has been positioned, the alpha/numerical characters can be changed by pressing the right (+) or (-) keys.

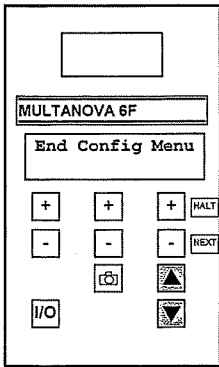
As soon as the character has been set move the cursor to the next character and repeat the above sequence.

Set low acoustical signal to "OFF"



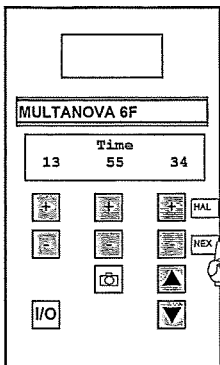
If the lower limit is set to detect all vehicles above e.g. 20 km/h (this is required when using the Multacard recorder), all vehicles measured will activate the lower tone. This low violation tone may be found annoying and can be switched off by pressing the middle (+) or (-) key.

Exit configuration menu



Press the page down key to exit the configuration menu.

Time



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.

12.1 Alarm indications

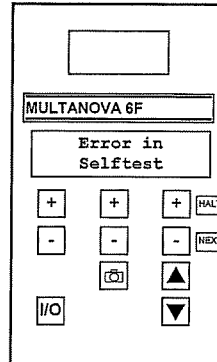
The unit distinguishes between main and secondary alarms.

11.1.1 Main alarms

- Error in quartz test
- Camera alarm
- Battery low
- Film feed fault
- Other non-specific faults

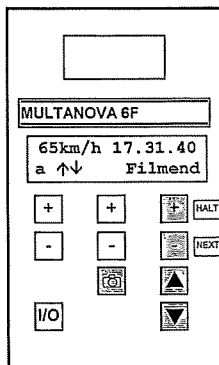
With these alarms there is a main functional disturbance in the unit. All unit functions are therefore blocked until the fault is eliminated and the unit is switched on again. With a main alarm the unit only reacts to the I/O key.

Self test failure



The current measurement is cancelled and the unit blocked for further measurements. Interrupt measurements and take unit to nearest service centre for test.

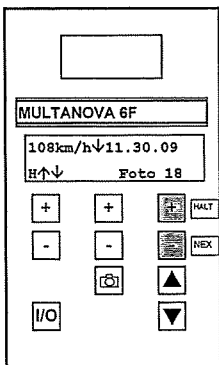
End of film



Page up to the photo line and

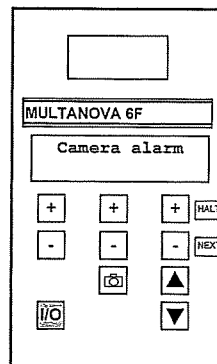
- Insert new film
- Set photo No. to 00 by pressing the corresponding (+) and (-) key simultaneously
- Press camera key (test photo's 3 pictures)
- Page back to "Measuring mode"

Manual measuring operation



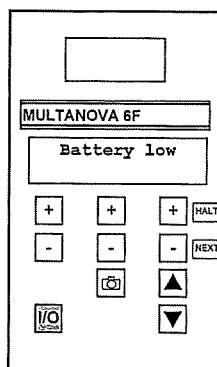
HALT key depressed =
Unit inactive for further measurements.
NEXT key depressed =
Unit active until next measurement

Camera alarm



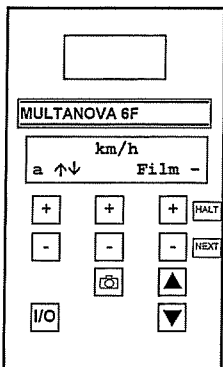
If the camera alarm should show up on the display, switch unit off the unit and then on again. If photo alarm reappears, then the camera unit is faulty. Please contact your local service centre.

Battery low



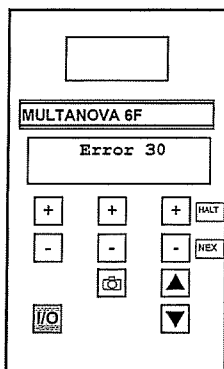
If the battery low display is shown this will mean that the battery voltage is insufficient. Please switch off the system. If Battery low is displayed and the unit is switched on again, measurements may be possible until next camera release. If the battery voltage falls further, the unit will automatically switched off the system completely and cannot be switched on again. Please have the battery exchanged.

Missing film



If the film is missing in the camera, then the display will show the warning "Film-".

Error faults



Error messages, which set the 6F to a waiting condition can only be cancelled when the error is eliminated and the unit switched off and on again.

Refer to fault-list in the operating manual Table below. If no definite cause can be found and the fault reappears after switching on, please contact your service centre.

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Fault list

Error messages in conjunction with the transfer ZSE – Multa-FT-2 or MultiScript camera unit. These errors always occur when an expected reply does not arrive. The 6F is not set to a blocked condition, it can continue to operate. The message can only be deleted by switching off the 6F (priority 2). The message consists of the word "Error" and a number as described below.

Number	Error
2	The camera unit has understood the request to send the status, but has not replied within a specific time (this is the first data exchange between the ZSE and the camera unit after switching on the unit).
3	As error 2, but error other than time exceeded.
5	The camera unit has not understood the request to send the film data (routine FTSOUT).
6	The camera unit has not understood the request to prevent the x-contact message.
7	The camera unit has not understood the request to send the STATUS.
8	The camera unit has not sent the STATUS within a specific time.
9	As error 8, but error other than time exceeded.
10	The camera unit has not acknowledged the command to take a photo (routine FTSHT).
20	A message for the top line of the display has not been acknowledged (often with test-photos).
21	A message for the bottom line of the display has not been acknowledged.
22	The date message has not been acknowledged.
24	The transport command has not been acknowledged.
25	The transport is blocked.
26	The transport was not correctly performed but delayed by the camera unit.
27	The conditional transport command has not been acknowledged.
29	Other errors in transport command routine.
30	The camera unit has understood the request for transport, but has not confirmed it within a specific time.
41	A message for the bottom line of the display has not been acknowledged (tacho mode of operation).
42	A message for the bottom line of the display has not been acknowledged (moving radar mode of operation).
50	The camera unit has not acknowledged the request to send the display values.
51	The camera unit has understood the request to send the display values, but has not done so within a specific time.
52	Other errors than 50 and 51.
60	The camera unit has not confirmed receipt of the display values (from the BG)

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Errors in conjunction with actuation of the 6 test photos to determine the correct display:

- 70 The camera unit has not acknowledged the request to take 6 test photos.
- 71 One of the 6 transport operations was not confirmed in a specific time.
- 72 The camera unit has transported automatically after too long a time.
- 73 Transport blocked.
- 74 Other errors than 70 to 73.

Errors in conjunction with the "Start distance" photo:

- 80 The camera unit has not acknowledged the "Start" message.
- 81 The camera unit has not acknowledged the start value message "Kxxx,x".
- 82 The camera unit has not acknowledged the "Y" identification message concerning a start distance photo.
- 83 The camera unit has not acknowledged the "Kxxx,x" km-reading message in the moving radar.

11.1.2 Secondary alarms

- Test photo missing
- End of film
- Flash alarm
- Flash battery discharged

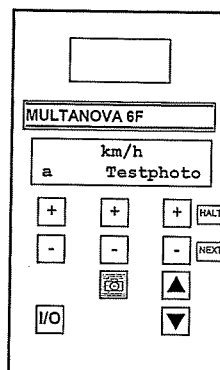
With this kind of alarm only the camera release is blocked until the cause of the fault is eliminated. The remaining functions (measuring operation, data input) remain unaffected.

The alarm display appears continuously in the measuring line and "Photo data" line, while in the remaining lines it only appears after pressing the camera key.

With flash alarm or for discharged flash battery the alarm can be cancelled by switching off the flash unit.

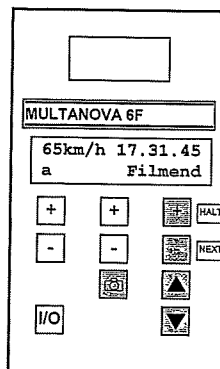
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Testphoto missing



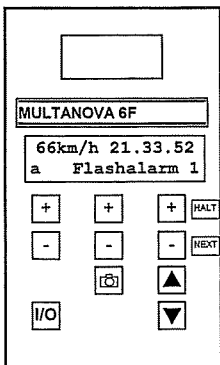
If the display should show "Testphoto" then the camera key was not pressed after resetting the photo no. to 00. Therefore the last photo is missing. Press the camera key.

Filmend



Page up to the photo line and
-Insert new film
-Set photo No. to 00 by pressing the corresponding (+) and (-) key simultaneously
-Press camera key (test photo's 3 pictures)
-Page back to "Measuring mode"

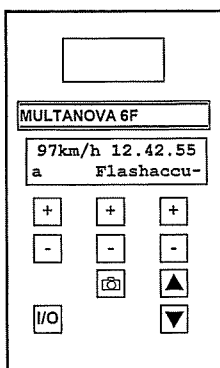
Flash alarm



If flash alarm should appear in the display, then the flash lamp is overheated.

The alarm is cleared automatically after cooling time of approx. 90 seconds.

Flash battery discharged



If "Flashaccu -" should appear on the display, then the flash unit battery is discharged.

Please replace the battery.

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Error messages or warnings in clear text, which disappear following elimination or execution according to the operating instructions. The 6F can then continue operation without switching off and on (priority 3):

- Flash alarm 2 The second flash is not charged (only for double photo).
- Flash lamp ? Is a warning. The lamp function should be checked.
- Transport- The camera unit has indicated that transport has not taken place.

Warnings in clear text, which disappear following elimination or execution of an instruction. The 6F can then continue operation without switching off and on (priority 4):

- Moma on Error: power has already been supplied to the motor or the release magnet for a long time.
- Error Warning: (The same message in the camera unit on the bottom line of display.) This message always appears when the display command (transport command) is ready to come 5 seconds after activating the release magnet (long presence of a vehicle in the beam with frontal measurement).
- Timeout Warning: (The same message appears in the camera unit on the bottom display line.) This message only appears for double photos if the 2nd photo was taken after more than 500 ms.
- Flashl Warning: The camera unit has an aperture control, which requests the flash, but the flash unit is not switched on.
- Mo bloc Error: the motor is blocked.

If several messages occur, the uppermost error message is displayed in the list shown. The equipment must be returned to the next authorised service in case any defects occur, in particular incorrect data display.

12.2 Setting the sensitivity and inclination of the DRS

- "Near" Exclusive monitoring of traffic lane running immediately beside the unit.
- "Medium" Monitoring of traffic lanes with a lateral distance up to approx. 6 m from the unit.
- "Far" Monitoring of traffic lanes with lateral distance up to approx. 15 m

Since the front of most vehicles provides better reflectors than the back, the sensitivity of the radar antenna appears greater for front measurements than for those from the rear.

It is often observed, that the sensitivity of the antenna is considerably reduced by rain. This reduction of sensitivity is not caused by attenuation or scattering of radiation by raindrops. The more likely cause is the form-12-78/104 Multanova AG Reg.Nr. 0001 6F

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tion of a water film on the surface of the antenna cover (random). The formation of such a water film can be prevented by treating the black antenna front cover (random) with a water repellent like silicone.

Important: The minimum required sensitivity should always be set at each measuring point.



If frequent cancellations occur with single measurements (only one vehicle in radar beam), the inclination of the radar antenna must first be checked. If this has been set correctly, it may be necessary to increase its sensitivity.

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13. Evaluation of photographs

In order to ensure a positive assignment of the displayed speed to the vehicle measured, photographs showing several cars must be evaluated.

13.1 Direction of traffic

The symbol displayed in front of the speed display must first be read.

The symbol "┘" means "receding traffic"

The symbol "┘" means "truck in receding traffic"

The symbol "└" means "approaching travel"

Only the vehicles shown in the specified direction are considered for the further evaluation.

13.2 Reconstruction of active radar zone on the photographs with lens focal lengths of 85 mm or 75 mm

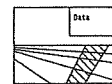
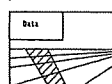
4 Imaginary photographs taken by a Jacknau camera are shown on page 13-80f. The camera is fitted with an 85 mm lens and aligned at an angle of 16° to the traffic lanes with vehicle mounting and at an angle of 19° for tripod operation.

Imaginary shots of similar form by a Robot camera are illustrated on page 13-81f. This camera is likewise angled at 16° to the traffic lanes with vehicle operation and at 19° for tripod operation, but is fitted this case with a 75 mm lens. The projection of the active radar zone on the road is shown as a dotted area on all drawings.

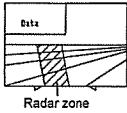
Jacknau camera, 85 mm lens

Vehicle mounting camera angle = 16°, right side of road

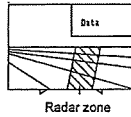
Vehicle mounting camera angle = 16°, left side of road.



Tripod operation, camera angle = 19°, right side of road.

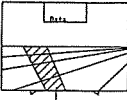


Tripod operation, camera angle = 19°, right side of road.



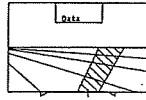
Robot camera, 75 mm lens

Vehicle mounting camera angle = 16°, right side of road



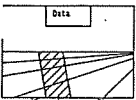
Radar zone

Vehicle mounting camera angle = 16°, left side of road.



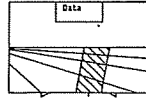
Radar zone

Tripod operation, camera angle = 19°, right side of road.



Radar zone

Tripod operation, camera angle = 19°, right side of road.

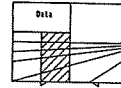


Radar zone

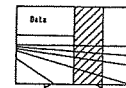
An evaluation range can then be defined in a simple way to represent the radar zone for all cases illustrated above. This evaluation range is limited by the following lines:

- the vertical line through the centre of the picture
- when measuring from the right-hand side of the road the vertical through the left notch at the bottom edge of the picture.
When measuring from the left-hand side of the road the vertical through the right notch at the bottom edge of the picture.

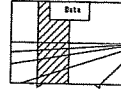
This evaluation range is depicted in the following diagrams for measurements with the Jacknau camera and Robot camera.



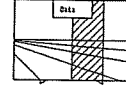
Jacknau camera (85 mm lens) Measurement from right side



Jacknau camera (85 mm lens) measurement from left side



Jacknau camera (75 mm lens) Measurement from right side



Jacknau camera (75 mm lens) measurement from left side

13.3 Evaluation of photographs of receding traffic

The following evaluation rule can be derived from the measuring sequence described in 2.6:

The measured vehicle must have covered a distance of at least 4 m (about one car length) in the evaluation range at the instant of camera release.

It normally just left the evaluation range and covered less than approx. 2 m (about half one car length) after leaving the evaluation range.

If several vehicles on the photograph satisfy this evaluation rule, the shot must not be evaluated.

After the camera release, the validity of the measurement was not yet completely established. It can therefore happen, that instead that the cancellation sign is superimposed instead of a speed value.

Photographs in which several vehicles satisfy this evaluation rule are suppressed as far as possible by the digital computer.

If, however, several vehicles pass the radar unit simultaneously at roughly the same speed, the shots thereby produced cannot always be reliably evaluated. It can also occur that a further, more distant vehicle was masked by a vehicle passing more closely to the radar unit, so that it was not possible for the DRS to "see" it.

The photographs illustrated on page 13-83 Fig. 1 show situations in which the measurement assignment can be made satisfactorily with the aid of the evaluation rules.

The photograph Fig. 2 on page 13-83 on the other hand cannot be evaluated with certainty.

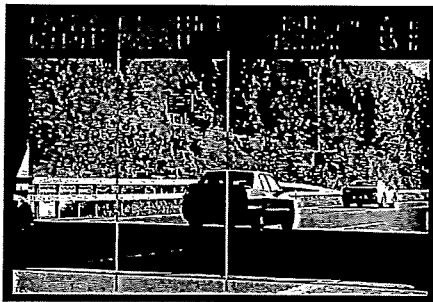


Fig. 1 shows a rear measurement that can be evaluated

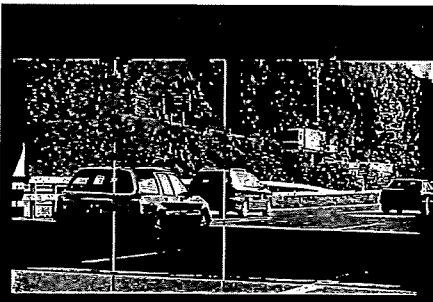


Fig. 2 shows a rear measurement which cannot be evaluated with certainty

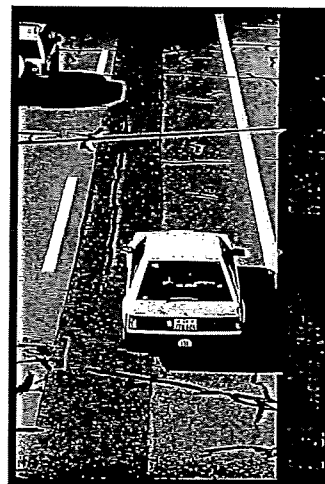


Fig. 4 shows a rear bridge tripod measurement that can be evaluated

13.4 Trucks in receding traffic

The Fig. 5 on page 13-85 shows a typical shot of a truck.

It can occur that a group of cars, passing the radar unit at short intervals and at roughly the same speed, is evaluated and photographed as a truck.

Pictures of this kind may be evaluated if only one of the vehicles shown satisfies the evaluation rules.

It can happen in rare cases that a single car in a lane far from the radar unit supplies a good signal over a considerable length of travel. If the signal length is longer than 12 m, a car of this kind is evaluated as a truck by the unit and, if the speed of this car is above the set speed limit for trucks, it is photographed.

Pictures of this kind can be evaluated in accordance with the normal evaluation rule.



Fig. 5 shows a typical real picture of a correct measured truck

The photographs illustrated on page 13-86 Fig. 7 show situations in which the measured value can be assigned satisfactorily with the aid of the evaluation rule.



Fig. 7 shows a front-measurement that can be evaluated

13.5 Evaluation of photographs of approaching traffic

When measuring approaching traffic the measured vehicle is photographed immediately after its speed has been measured.

The distance covered by the vehicle in the evaluation range up to the photo position comprises the following partial distances:

- entry detection (approx. 0.5 m)
- detection of speed value (minimum 0.3 to maximum 2 m)
- a fixed delay determined by the mechanical inertia of the camera (approx. 1 m at a speed of 100 km/h).

From this it is apparent that the measured value can only be assigned to a single vehicle present in the evaluation range.

In cases where several vehicles of the approaching traffic are shown in the evaluation range, the cancellation symbol frequently appears in the data projection.

If a speed value is projected in such a case, it may be that the vehicles in question passed the radar unit at about the same speed, or that one of the vehicles was masked by another, so that it could not be "seen" by the DRS.

Shots of this kind must not be evaluated.



Fig. 8 shows a front bridge measurement that can be evaluated

13.6 Use of 135 mm and 150 mm lenses

When monitoring traffic lanes at a long lateral distance from the radar unit the vehicle registration plates are difficult or impossible to read when using the standard lens (75 mm or 85 mm).

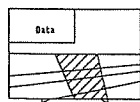
The Jacknau camera can be fitted with a 135 mm lens and the Robot camera with a 150 mm lens to improve photographs of vehicles at a long distance.

When using a lens with a focal length this long and alignment of the camera at 160 to the traffic lane(s), the active radar range is no longer completely shown on the photograph. Therefore, when using lenses of 135 mm or 150 mm, the camera must be aligned at an angle of 22° to the traffic lane(s), both with vehicle mounting and for tripod operation.

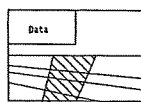
The following drawings show imaginary shots taken by a Jacknau camera with 135 mm lens and a Robot camera with 150 mm lens. The cameras are aligned at an angle of 22° to the traffic lanes and are set up on the left or right hand side of the road.

When using these lenses, the projection of the active radar range on the road is roughly the same for vehicle mounting and for tripod operation. Therefore, no distinction is made in the following drawings between the two forms of mounting.

Jacknau camera, 135 mm lens

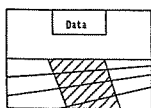


Measurement from right side

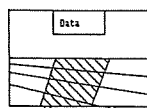


Measurement from left side

Robot camera, 150 mm lens



Measurement from right side



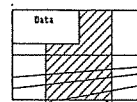
Measurement from left side

An evaluation range can be defined in a simple way to represent the radar zone for all the cases illustrated above.

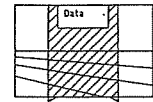
The evaluation range is limited here by the following lines:

- the vertical through the left notch at the bottom edge of the picture,
- the vertical through the right notch at the bottom edge of the picture.

This evaluation range is depicted in the following diagrams for measurement from the right or left-hand side of the road for the Jacknau and Robot cameras.



Jacknau camera, 135 mm lens



Robot camera, 150 mm lens

Evaluation of the photographs is performed according to the rules in sections 12.3 and 12.5

14. Operation of unit with bridge tripod

14.1 General



Fig. 9 shows a bridge tripod

The equipment required for bridge measurement comprises a tripod system and a special carrier for the camera unit. There are versions of this special carrier for both the Robot MultiScript and the Jacknau camera FT - 2 units.

The camera unit is aligned from the special carrier under an angle of 15° to the traffic lane to be monitored, so that the photographs obtained of the receding or approaching traffic can be reliably evaluated.

14.2 Selection of measuring points

Bridges over traffic lanes are suitable as measuring positions if:

- they do not deviate by more than 10° from the perpendicular to the traffic lanes,
- their railing is not higher than 1.2 m, or: their railing is designed so that it does not impair the free radiation from the DRS and the viewing range of the camera.

14.3 Setting up and adjustment

14.3.1 Setting up the tripod

On bridges over traffic lanes, the tripod should be set up on the side of the traffic to be monitored above the centre of the lane.

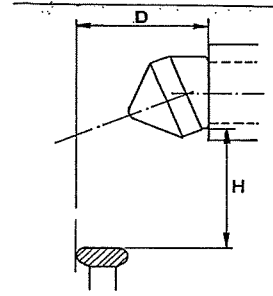
Two of the tripod legs should be set as close as possible to the foot of the bridge railing.

- Loosen clamping screw on the tripod head and set up tripod chassis with ZSE, DRS and special carrier with camera unit.
- Tighten clamping screw.
- Set the mark provided on the DRS for bridge measurement to 0° . Tighten DRS carrier.
- Set tripod chassis to required height and align with axis of traffic lane.

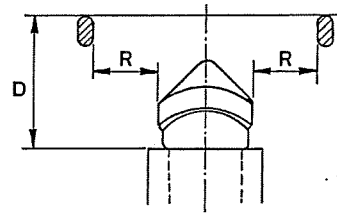
- To ensure that the radar antenna can radiate freely:

To ensure that the radar antenna can radiate freely:

- the height H of the lower edge of the DRS above the railing structure must not be less than the horizontal distance D measured (see diagram below).



The radial distance R to the remaining structural parts of the bridge railing adjoining and above the DRS must not be less than half the measured horizontal distance D (see diagram below).



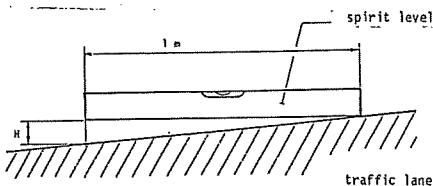
14.3.2 Adjusting the installation

- First compensate the lateral inclination of the tripod chassis by shortening or extending one of the front tripod legs. Check with the aid of the spirit level on the tripod chassis.
- Set the traffic lane longitudinal inclination (slope up or down in %) with the rotary knob of the inclination indicator on the camera unit carrier. Setting accuracy 0.1% , whereby one graduation on the side scale provided with pointer represents an inclination of 1% and on the scale of the rotary knob 0.1%
- The inclination of the tripod chassis is then adjusted by shortening or extending the rear tripod leg, until the spirit level provided in the inclination indicator has settled.

Note: If the inclination of the traffic lane (slope up or down) is not known, it can be determined as follows:

- Determine approximate measuring one of DRS on the traffic lane (approx. 20 m before foot of bridge).
- Determine the longitudinal inclination (slope up or down) at this zone, as shown in the following diagram.

A spirit level 1 m long and a scale are required for this purpose.



The height H in cm measured over 1 m corresponds to the gradient up or down in %.

Several checks in the approximate measuring range of the DRS are necessary in order to exclude any irregularities in the traffic lane.

- Check alignment of tripod chassis with axis of traffic lane and correct if necessary.
- Check lateral inclination of tripod with the aid of the spirit level on the tripod chassis. If the bridge is not exactly perpendicular to the traffic lane's below, shortening or extension of the rear tripod leg alters the lateral inclination of the tripod.
- If necessary, compensate for lateral inclination of tripod chassis by correcting length of one of

the front legs.

The longitudinal inclination of the tripod chassis must then be checked again and corrected if necessary.

- Check and correct lateral and longitudinal inclination until both are correct.
- Check setting height of DRS again as described above.
- Switch on and operate the system in accordance with the foregoing instructions.

14.4 Evaluating of photographs

- When monitoring the receding traffic, the vehicle which was the last to completely cross the lower edge of the picture in the lane monitored is the vehicle measured. (see Fig. 1 on page 13-83)
- When monitoring the approaching traffic, the vehicle which is illustrated in the immediate vicinity of the lower edge of the picture in the lane monitored is the vehicle measured. (see Fig. 7 on page 13-86)

Note:



It can occur that the vehicle measured has already crossed the lower edge of the picture, so that registration number can no longer be read (see Fig. 2. on page 13-83).

15. Tacho projection TE- 6F

15.1 Equipment configuration

A tacho generator, which is mechanically fitted in the tacho chord between the gear and the vehicle speedometer, is needed to measure the speed. The generator converts the tacho chord speed to electrical pulses which are fed into the central control unit (ZSE). The electrical pulses go to an additional electronic circuit fitted in the ZSE and are processed in a special tacho measuring program.

The operating unit has a special tacho line which allows the user to check the calibration, the tacho measurement and view the measured speed.

The camera can be triggered by pressing the camera key on the operating unit. The speed of the measuring vehicle, the time and date are superimposed onto the film.

The camera is mounted parallel to the vehicles axle. The measuring range of the electronic speedometer is 20 to 250 km/h. The tolerance of the speed measured lies between ± 1 km/h with speeds up to 100 km/h and $1\pm$ % with speeds 100 km/h and above.

15.2 Installation

The following material is needed in order to operate the system as a tacho speedometer:

- MULTANOVA 6FJ or 6FR radar system
- Car Installation
- Tacho generator built into the vehicle
- Additional circuit in the ZSE
- Special programs in the central-control-unit and operating-unit.

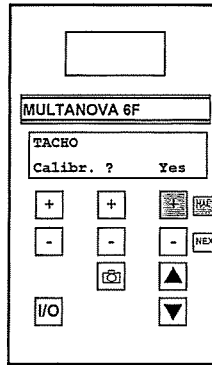
After the tacho generator, the additional circuit (ZSE) and software has been installed, no special instructions are needed to install the ZSE (chapter 6.1).

15.3 Calibration check of the tacho measurement

In order to do the calibration check, the tacho line has to be viewed on the operating unit and the measuring vehicle parked. If the vehicle is moving, the calibration mode will be skipped, the speed measured and displayed.

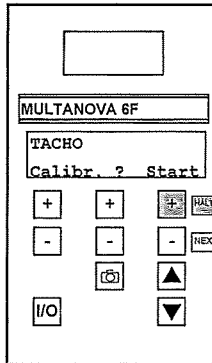
The tacho line comes directly after the film-length line (chapter 10) and displays the following picture:

Calibration



To do a calibration press the "*" under the displayed "Yes" (Halt key). The following picture will then appear on the display.

Calibration Start

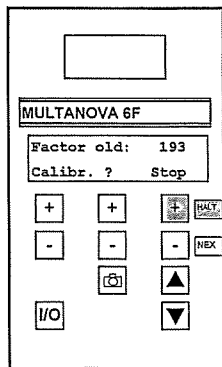


The vehicle can now begin to move.

A distance of 1 km has to be driven in-order to calibrate the system. An exact measured more or less straight lined motorway would be suitable. The halt key is pressed at the beginning of the 1 km stretch. The speed of the vehicle should be low but not under 20 km/h in-order to trigger the exact starting point of the calibration.

The display will then show the following picture.

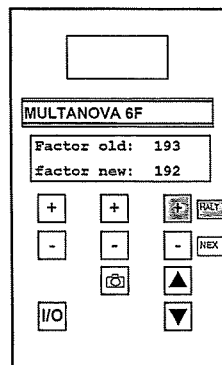
Calibration Stop



The calibration stretch must be driven without changing lanes. The speed can be increased but must be reduced at the end of the calibration stretch in-order to stop the calibration check exactly. During the calibration check, be sure that the vehicles speed doesn't fall under 20 km/h.

When arriving at the 1 km marker the Halt key is pressed again and the calibration check is finished. The following picture will then appear of the display:

Calibration Factor Display



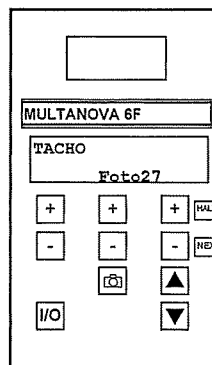
The "factor old" is the momentary in the ZSE set factor. The "factor new" is the during the calibration check calculated new factor. If the new calibration factor deviates more than Δ % to the old factor, then the new factor has to be set in the ZSE.

The calibration adjustments in the ZSE must be done through an authorised person. The calibration check has to be done every 6 months after driving 5000 km or after changing the tires.

15.4 Operating mode

If the tacho line is called while the vehicle is moving or when parked, the "Calibr. ?" is not answered by pressing the "*" key under the display "Yes" (the Halt key), then the tacho measurement will start when the vehicle is moving faster than 20 km/h.

The display will then show the following picture:



The upper display will show your driving speed. The under display an indication "TACHO" and the number of the last photo.

Do you wish to measure the speed of a vehicle and take a picture, then its important to keep a constant distance between the vehicle to be monitored for the duration of a few seconds. The camera has to take at least 2 pictures with an approximate 4 second interval between the pictures. To trigger the camera, the "camera key" on the operating unit has to be pressed. Further operating instructions can be read in the previous capitals (in-particular the chapter 7, 9, 10 and 11).

15.5 Film analysing

The distance between the violator and measuring vehicle should not deviate more than 5% between the two pictures. The precision at which a deviation can be detected is dependent on the distance between the two vehicles. Scaled enlargements of both pictures are required in-order to be able to confirm that a constant distance was kept. To prove that the distance between the vehicles on both pictures were constant $\pm 5\%$, the vehicles width, for example, can be measured.

example: Car width first picture D = 25 mm
Car width second picture D = 24.5 mm

D = .5 mm = 2% deviation

16.2 Installation

The following material is needed to operate the moving radar:

- MULTANOVA 6F - radar system
- Car installation
- Tacho generator built into the vehicle
- Additional circuit in the ZSE
- Special programs in the central-control-unit and operating-unit.

No special instructions are needed to install the ZSE. The radar antenna is either mounted up front or in the back (chapter 5.1).

The photo unit is mounted just like in the stationary radar systems with a camera angle of 16° (chapter 8).

16.3 Calibration check of the tacho measurement

See chapter 15.3

16.4 Mode of operation

The following settings have to be set in the operation mode line :

- \uparrow receding traffic, antenna mounted up front
- \downarrow approaching traffic, antenna mounted in the back
- auto automatic operation
- Hand manual operation
- only near or middle sensitivity is required due to the vehicles passing close to the measuring vehicle.

16.5 Operating mode

The speed of the measuring vehicle must be above 20 km/h and 10 km/h under the speed limit. The measuring vehicle must move at a constant speed.

The control-unit must be in the moving radar mode.

16. Moving Radar MR-6F

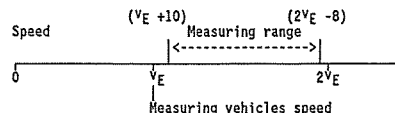
16.1 Introduction

The operating mode "Moving radar" is ideal to measure speeds of vehicles which overtake the measuring vehicle. The operation is only meaningful on a multilane road. The measuring vehicle drives on the first lane about 10 km/h slower than the tolerated limit. Vehicles violating the speed limit will overtake the measuring vehicle. The relative speed of the overtaking vehicle is measured by the radar system and is added to the through the tacho system calculated own speed. The total of both speed values is the absolute speed of the overtaking vehicle. Is the absolute speed higher than the set photo-limit, then a photo will be made.

On the picture the speed of the violating vehicle (including arrow for direction of travel) and the speed of the measuring vehicle is superimposed.

The overtaking vehicles are measured from behind with a front installation (radar antenna built-in up front and the camera looking forward). With the radar antenna built in the back and the camera looking in the same direction front pictures can be taken from the over-taking vehicles.

The measuring range of the moving radar lies between the speed of the measuring vehicle + 10km/h and the double speed of the measuring vehicle - 8 km/h. Speeds higher than the double speed of the measuring vehicle can not be measured.

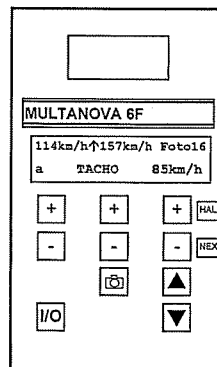


Example:

Measuring vehicles speed $v_E = 80$ km/h
the measuring range is 90 to 152 km/h

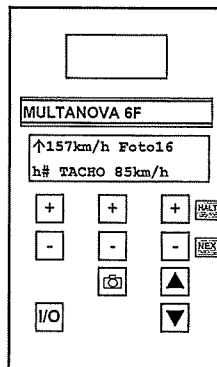
The displayed speed has a margin error of 4 km/h with speeds up to 100 km/h and 4% with speeds 100 km/h and above. All errors are taken into consideration, the tacho and radar measurement and the angle fault due to slant driving of the measuring vehicle.

Moving radar operation automatic



- 114 km/h: least measured speed
- 157 km/h: speed of last violation
- 85 km/h: speed of the measuring vehicle
- a: indication for automatic operation

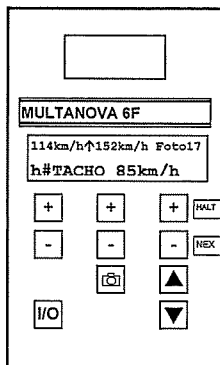
Holding the last measurement



- h# indicates inactive system (#blinking)
- Press the "HALT" key
- System is inactive for further measurements
- Press the "NEXT" key
- System ready for next measurement

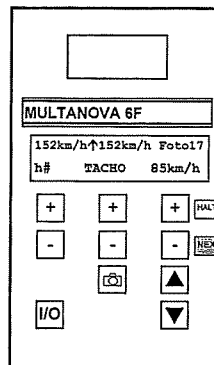
If an overtaking vehicle has been measured, the speed will be displayed in the upper display. If the measured speed exceeds the limit set, then the speed will also be displayed in the left corner of the under display. If the photo limit is exceeded then the camera will be triggered and a picture is taken. The speed of the measuring vehicle will always be displayed.

Moving radar operation manual



114 km/h: last measured speed
 157 km/h: speed of last violation
 85 km/h: speed of the measuring vehicle
 h: Indication for manual operation

HALT-position



152 km/h: just measured speed
 h#: Indicates inactive system (# blinking)
 Press the "NEXT" key: System ready for next measurement.

Further operating instructions can be read in the previous chapters 12 Measuring operation.

16.6 Evaluation of photographs

See chapter 13 Evaluation of photographs

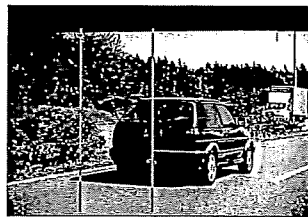


Fig. 10 shows a rear-measurement from a moving radar



Fig. 11 shows a front-measurement from a moving radar

16.7 Peculiarities of the moving radar

Because the measuring vehicle is always moving, the radar antenna will always detect Doppler-signal.

The Doppler-signal however, comes from the opposite direction to the signal of an overtaking vehicle.

The signal doesn't correspond to the measuring direction set on the control-unit and will therefore not falsify the radar measurement. However you have to take into account that there will be more cancellations of measurements, then when doing stationary radar.

It may happen that you can not change the lines on the operating-unit. This can be due to the wrong measuring direction being set on the control-unit while the vehicle is moving. Switch the system off and on again to clear the fault.

The radar measurements undergo the same severe measuring criterion as in the stationary operation. The measuring vehicle has to be driven at a constant speed to be certain that the measurement will be accepted. The radar measurement will also only be accepted as long as the overtaking vehicle doesn't accelerate or apply brakes.

16.8 General hints and contact

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