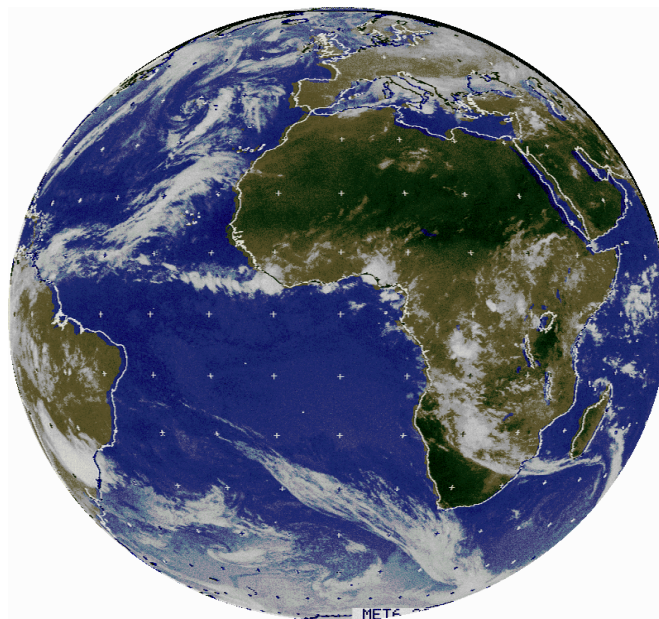


WRAASE
WSD-700
Weather Satellite Receiver
NATO SUPPLY No. 7730 12 3380684
OPERATING MANUAL



WRAASE electronic



Kronsberg 10
24161 Altenholz
Germany
Phone: 49-431-32528
Fax: 49-431-32579
NATO-CODE C4322

Table of Contents

1. ANTENNA INSTALLATION

1.1	GENERAL	05
1.2	GUIDELINES for ANTENNA INSTALLATION and POSITIONING	05
1.2.1	DISH ANTENNA for GEOSTATIONARY SATELLITES	05
1.2.2	OMNIDIRECTIONAL VHF-ANTENNA KX-137	06

2. DESCRIPTION AND LEADING PARTICULARS

2.1	GENERAL	08
2.2	VHF-RECEIVER	08
2.3	WSD-700 IMAGE MEMORY STRUCTURE	09
2.3.1	LOOP MEMORIES	09
2.3.2	BUFFER MEMORY and TRANSFER OPERATIONS	09
2.3.3	AUXILIARY MEMORY and RETRANSFER OPERATIONS	10
2.3.4	LIST of AVAILABLE SHIFT OPERATIONS	10
2.4	INTERNAL BUS STRUCTURE of WSD-700 SYSTEM	10
2.5	TABLE of DISPLAY SELECTOR FUNCTIONS (Sw.#5).....	11

3. CONTROLS AND INDICATORS

3.1	FRONT PANEL CONTROLS AND INDICATORS	12
3.2	REAR PANEL CONTROLS AND CONNECTORS	14
3.3	FRONT PANEL CONTROLS and INDICATORS IN DETAIL	15
3.4	REAR PANEL CONTROLS	23

4. OPERATING THE WSD-700

4.1	RECEIVING IMAGES (Manual Mode)	25
4.1.1	GEOSTATIONARY SATELLITE (Manual Mode)	25
4.1.2	POLAR ORBITING SATELLITE	26
4.2	DISPLAYING IMAGES	28
4.2.1	GENERAL	28
4.2.2	DISPLAYING LOOP MEMORIES	28
4.2.3	PROGRAMMING A LOOP-MEMORY ARRAY for DISPLAY	30
4.2.4	MANUAL DISPLAY	30
4.2.5	AUTOMATIC LOOP DISPLAY	31
4.2.6	DISPLAY ON THE PRINTER	31

4.3	AUTOMATIC PROCESSING	31
4.3.1	GENERAL	31
4.3.1.1	PROGRAMMABLE CLOCK TIMER; Principle of Operation.....	31
4.3.1.2	TIME DISPLAY FORMAT and TIMER INFO LINE (TIL).....	32
4.3.2	PREPARING AUTOMATIC PROCESSING	32
4.3.2.1	PROGRAMMING THE TIMER	32
4.3.2.2	SYNCHRONIZING THE CLOCK	34
4.3.2.3	ERASING A TIMER PROGRAM MEMORY LOCATION(SEGMENT)	34
4.3.2.4	MODIFYING A TIMER PROGRAM MEMORY LOCATION	34
4.3.3	AUTOMATIC RECEPTION	36
4.3.4	AUTOMATIC PRINTING	36
4.3.5	AUTOMATIC RECORDING OF NOAA-IMAGERY	37
4.3.5.1	GENERAL	37
4.3.5.2	PROGRAMMING NOAA-RECORDINGS	37
4.3.5.3	PLAYING NOAA-IMAGES BACK FROM DAT-RECORDER	38
4.4	SPECIAL FUNCTIONS	38
4.4.1	SIGNAL LEVEL ADJUSTMENT	38
4.4.2	ZOOMING LOOP IMAGES	39
4.4.3	JOINING LOOP IMAGES	39
4.4.3.1	GENERAL; PRINCIPLE of OPERATION	39
4.4.3.2	JOINING IMAGES; MANUAL MODE	40
4.4.3.3	JOINING IMAGES; AUTOMATIC MODE	41
4.4.4	SPLIT SCREEN MODE	43
4.4.5	ALTERNATING LOOPS	43
5.	APPENDIX (ENHANCEMENT CURVES, DIAGRAMS ETC.	44

WRAASE WSD-700 USER'S GUIDE.

Copyright © 1995 by Volker WRAASE. All rights reserved.

Information in this document is subject to change without notice and does not represent a commitment on the part of *Wraase electronic*.

GUIDELINES FOR SAFE OPERATION

This equipment must be earthed (grounded) to prevent electrical shock hazard.

- When a 3-pole (ground-type 2-pole) ac outlet is available, the WSD-700-frame will be automatically connected to earth potential when the power cord is plugged into the outlet.
- When such 3-pole outlet is not available or when the DC/AC-Inverter is used, the WSD-700 must be directly connected to earth potential through the rear panel ground terminal.
- Do not operate this equipment if any cables are damaged.
- Do not open this equipment, there are no user-serviceable parts inside. Refer servicing to qualified personnel.
- Ensure that any wires and cables are routed sensibly so that they cannot be snagged or tripped over. Do not tug or twist any wires or cables, or use them to hang or lift any of the units.
- Keep the plastic bags used in the packaging away from children and animals.
- Wear gloves when installing or taking down the telescopic mast and antennas.

WARRANTY

All parts of the Weather Satellite Receiver System are warranted by *WRAASE electronic* of Germany against defects in material or workmanship for a period of one year from the date of delivery. In the event of a defect occurring during the warranty period, *WRAASE electronic* will repair or replace this product within a reasonable period of time after notification, free-of-charge, provided, that: It is returned to *WRAASE electronic* or it's Maintenance Location; has not been misused; has not been damaged by an act of God; and that the user has followed the instructions in the operation manual.

Any unauthorized modification, repair, or attempt to repair will render this warranty void.

In no event shall *WRAASE electronic* be liable to the customer for any damages, including lost profits, or other incidental or consequential damages, arising out of the use or inability to use these products.

All requests for repair or replacement under this warranty must be made as soon as possible after the defect has been noticed and must be directed to *WRAASE electronic* or it's representative.

SECTION 1

ANTENNA INSTALLATION

1.1 GENERAL

The standard ANTENNA SYSTEM for the **WSD-700** WEATHER SATELLITE RECEIVER consists of the following components:

1. PARABOLIC DISH ANTENNA model PD-1000 with FEED for geostationary satellites and MAST MOUNT.
2. S-BAND CONVERTER MRC-700.
3. OMNIDIRECTIONAL VHF ANTENNA model KX-137 (crossed dipoles) for polar orbiter satellites in the 137 MHz range with built-in preamplifier.
4. TELESCOPIC MAST (9m high) for VHF ANTENNA with guy wires and pins.
5. TRIPOD with adjustable legs.

The antenna system consists of an S-band dish antenna for reception of geostationary satellite signals, and an omnidirectional VHF antenna for reception of polar orbiter satellite signals. The complete antenna system, S-band, and VHF was designed for easy and quick field installation. Therefore, both antenna systems were combined. However, the two antenna systems may be separated for better VHF results. For example, the mast may be erected with the guy wires on a hill, and the tripod with the dish may be placed closer to the receiver for ease in turning the dish to the satellite(s).

It is not necessary to erect the complete antenna system, if only one type of satellite shall be received. If only geostationary satellites are to be received (METEOSAT, GOES, GMS), the DISH ANTENNA with FEED and S-BAND-CONVERTER, all mounted on the TRIPOD, will be sufficient. For POLAR ORBITERS only, the dish antenna with feed and S-Band-Converter is not needed.

1.2 GUIDELINES for ANTENNA INSTALLATION and POSITIONING

1.2.1 DISH ANTENNA for GEOSTATIONARY SATELLITES

A line-of-sight must exist between the dish antenna and the geostationary satellite. Satellite radiation does not pass through walls, buildings, trees or similar structures. If, however, a weaker signal is tolerable, installation of the antenna dish behind a glass window or in a tent may be possible. As long as the line-of-sight principle is satisfied, the height above surface is not important; but to avoid damage by strong winds, the dish should be located close to the surface. In difficult locations, however, when strong winds are not expected, it is possible to mount the dish on a higher segment of the telescopic mast in order to reach the line-of-sight (for example in a yard, surrounded by buildings). In such situations, the guy wires must be securely fastened.

The **WSD-700** receiver must be in the proximity of the antenna system during installation of the dish assembly. The relative field strength meter is used to align the dish toward the geostationary satellite. Follow the steps listed below to install the Dish Antenna.

1. Insert the feeder tube into the center-hole of the dish observing the „TOP“-mark on the tube. Insert the plastic nut on the rear, but do not pull it tight at this point of time.
2. Attach the mast clamp to the two 8mm (10mm) bolts on the rear of the dish and pull the nuts tight, use 13mm (17mm) wrench).
3. Mount the dish on the tripod or wall-mount.
4. Mount the MRC-700 downconverter close to the rear of the dish so that the sockets look down (otherwise the MRC-700 may be damaged by rainwater).
5. Connect the short cable from the feed to the S-band-converter MRC-700 **ANT**-socket.
6. Connect the **OUT** socket on the S-band-converter MRC-700 to the **CONV.** socket on the rear of the **WSD-700**. Make sure, that the correct channel has been selected at switch #3 (**M1** = 1691 MHz for all geostationary satellites), and that the timer is switched off (**TIMER** switch #24 in the middle **OFF** position).
7. Switch the WSD-700 on. After the satellite signal has been found, adjust azimuth, elevation and rotate the feeder tube for maximum signal meter reading and clearest signal tone. Note, that -depending on your location- you may have to rotate the feeder tube so that the „TOP“-label will not be up any more (this will be the case if the satellite is more than 25 degrees east or west from you). You may go through all three parameters twice for fine tuning, then pull the nuts tight and doublecheck to ensure that the dish and tripod are securely fastened. Take extreme care that you don't crunch or twist the antenna cable during all adjustments.

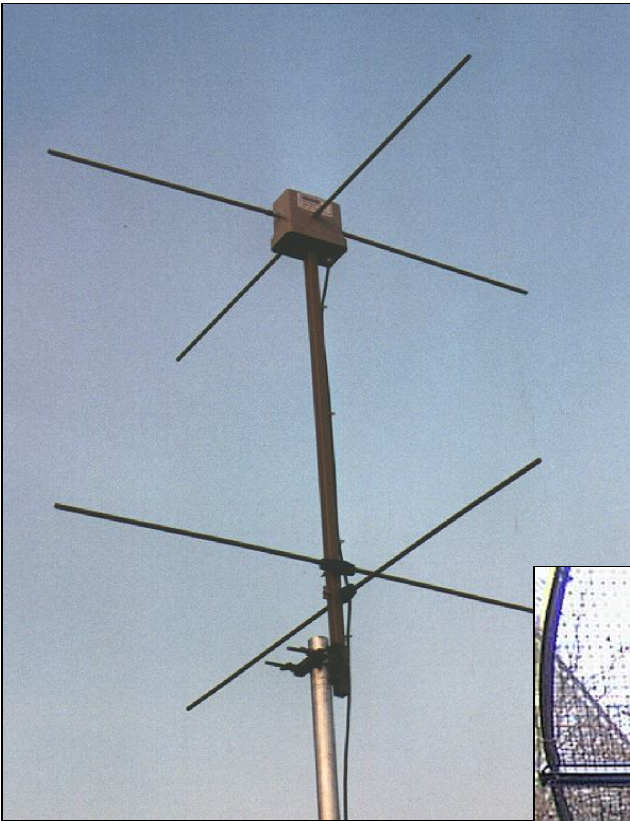
1.2.2 OMNIDIRECTIONAL VHF-ANTENNA KX-137

If reception of the polar orbiter satellites is desired, the OMNIDIRECTIONAL VHF-ANTENNA (crossed dipoles) has to be assembled and mounted on the top of the telescopic mast. See the Figures on page 3 for installation guidance. Install the short dipole elements on the two narrow sides of the antenna box.

Connect the socket on the antenna to the VHF-ANT.- socket on the rear of the **WSD-700**.

Normally, the mast does not need to be raised to its full length, except when surrounded by buildings. The mast should be secured with the guy wires.

KX-137 ANTENNA FOR POLAR ORBITER
SATELLITES



DISH ANTENNA FOR
GEOSTATIONARY
SATELLITES



SECTION 2

DESCRIPTION AND LEADING PARTICULARS

2.1 GENERAL

The **WRAASE WSD-700** system has the capability of receiving, storing and displaying imagery from geostationary and polar orbiting weather satellites. The complete **WEATHER SATELLITE RECEIVING SYSTEM** consists of the **WSD-700 SATELLITE RECEIVER**, an outdoor **ANTENNA SYSTEM** with **S-BAND-CONVERTER**, the **DISPLAY MONITOR(s)** and optional equipment, like **Printer**, **Digital Audio Recorder (DAT)**, **Videorecorder**.

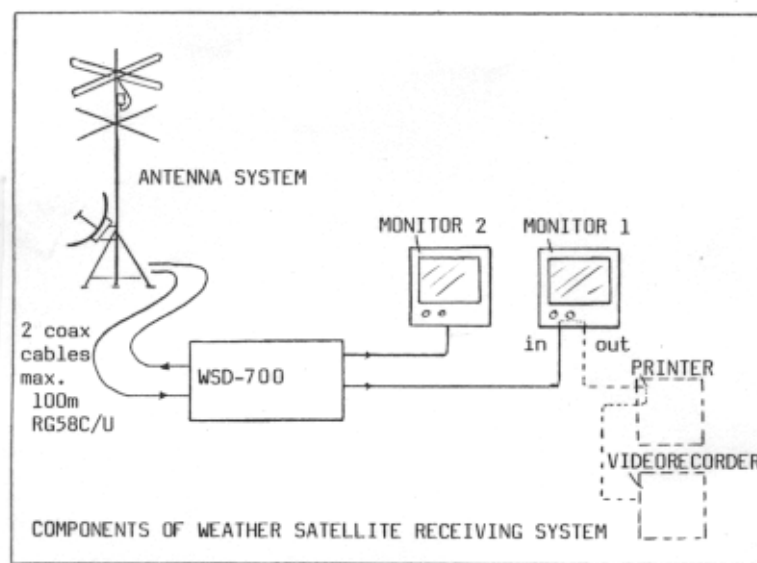


Figure 2-1. Hardware Components of WRAASE Weather Satellite Receiving Station

The **WSD-700** unit basically contains a **VHF-RECEIVER**, an arrangement of **IMAGE MEMORIES** and a **PROGRAMMABLE TIMER** for automatic image capture.

2.2 VHF-RECEIVER

The **VHF-Receiver** inside the **WSD-700** is controlled by the three knobs „**VOLUME**“ (#1), „**SQUELCH**“ (#2) and „**CHANNEL**“ (#3). Beside frequency selection, the **CHANNEL-SWITCH** (#3) will automatically perform mode-switching for **METEOSAT**, **NOAA**, **METEOR** and **GMS** as well as antenna-switching. Polar orbiting satellites are frequently outside the line of sight of the **VHF** channels. The **WSD-700** can scan the five **VHF** channels on a rotating basis. A variable squelch circuit reduces rushing noise while on scan mode. When a signal is detected on one of the channels, the scanner stops on that channel, and the **APT** signal can be heard through the loudspeaker. The receiver channels are controlled by easily exchangeable plug-in quartz crystals. *Table 2-1* lists the signal and frequency assigned to each step on the „**Channel**“ switch.

ASSIGNMENT	SOURCE	FREQUENCY (MHz)	REMARKS
M 2	METEOSAT CH2	1694,500 (141,00)	with Converter
M 1	METEOSAT CH1 OR GOES	1691,000 (137,50)	with Converter
SCAN	SCANNING VHF	(VHF-CH. 1 -5)	
1	NOAA-ODD	137,500	
2	NOAA-EVEN	137,620	
3	METEOR	137,850	
4	METEOR	137,300	
5	METEOR/OKEAN	137,400	
no [6]	FROM TAPE		
no [7]	GMS	1691,000 (137,500)	with Converter

Table 2-1: „CHANNEL“-SWITCH : Receiving Modes and Frequencies.

2.3 WSD-700 IMAGE MEMORY STRUCTURE

2.3.1 LOOP MEMORIES

For the generation of animated time lapse loops of the weather process, a number of image memories are necessary, which have to be filled up automatically with satellite shots of exactly the same geographic area taken at fixed time intervals (a service only provided by geostationary satellites).

In the *WSD-700*, sixteen „LOOP“-Memories are available, which can be arranged to form a single but long loop sequence or several shorter film loops of different geographic areas or different spectral ranges (infrared and visible light).

It should be mentioned, that the „LOOP“-Memories can also be used to store single images instead of film loops.

2.3.2 BUFFER MEMORY and TRANSFER OPERATIONS .

In the *WSD-700*-system, the sixteen *LOOP* memories are not directly (real-time) filled up with the images being received; instead, incoming picture information is first written into a *BUFFER* memory and then, if desired, fast-speed-shifted into a selected *LOOP* memory location.

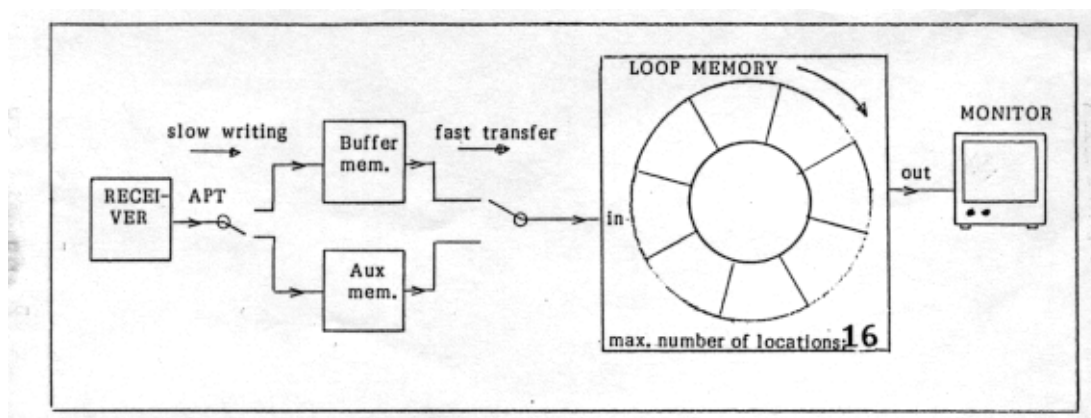


Figure 2-2: Simplified block diagram of Buffer/Aux- and LOOP memory arrangement.

Such „**IMAGE-TRANSFER**“ is released either manually by pressing the „**Transf.**“ button or automatically by the built-in PROGRAMMABLE TIMER.

Due to the **buffer**-system, loading of the loop memories is invisible and does not disturb the continuous display of animated loops. The current image transmissions can be viewed by switching the **buffer memory** directly to the monitor („Display Selector“ switch set to „Bu“) and thus, the decision, if and in which memory the image shall be retained, can be made after it has been completed in the **buffer** memory.

2.3.3 **AUXILIARY MEMORY and RETRANSFER OPERATIONS.**

To add even more flexibility to the system, an additional buffer memory, called „**AUXILIARY MEMORY**“ has been provided. Memory-system-features are completed with a **RETRANSFER** capability from LOOP to BUFFER memory, which, together with the TRANSFER operation, allows to move memory contents from any location in the system to nearly any other location. The following SHIFT-OPERATIONS are available:

2.3.4 **LIST OF AVAILABLE SHIFT OPERATIONS**

Bu ==> LOOP (1 ... 16) ; manual or timer controlled

Aux ==> LOOP (1 ... 16); manual or timer controlled

LOOP (1... 16) ==> Bu ; manual only

Aux ==> Bu ; manual only

LOOP ==> LOOP = LOOP ==> Bu ==> LOOP; manual only.

„**Bu**“ is: BUFFER MEMORY. „**Aux**“ is: AUXILIARY MEMORY.

All TRANSFER and RETRANSFER operations are selectable with the „**Display Selector**“ rotary switch (control # 5).

A detailed illustration of the internal BUS STRUCTURE and the different TRANSFER/RETRANSFER SOURCES/DESTINATIONS related to the different switch positions is given in *Table 2-2*.

2.4 **INTERNAL BUS STRUCTURE OF WSD-700 SYSTEM**

The following block diagram shows the MEMORY-BUS-STRUCTURE of the **WSD-700**. During image capture, the received signal is fed at slow (real-time) rate into Bu or Aux memory (selected with switch #5). A LOOP INPUT MULTIPLEXER is provided to select either Bu or Aux memory as a source for *Fast Data Transfer* to the LOOP MEMORIES. The „COL. MONIT.“ and „ALL MEMs“ **video-output** can be switched via the OUTPUT MULTIPLEXER to either the **LOOP** memories or **Bu** or **Aux** memory (selectable by the „Display Selector“ front panel switch #5). An **additional video-output** „LOOP“ allows simultaneous display of all or specific **LOOP** memories (with animation).

The RETRANSFER BUS feeds the BUFFER memory from the OUTP. MUX, i.e. LOOP or Aux memory content can be routed back to Bu.

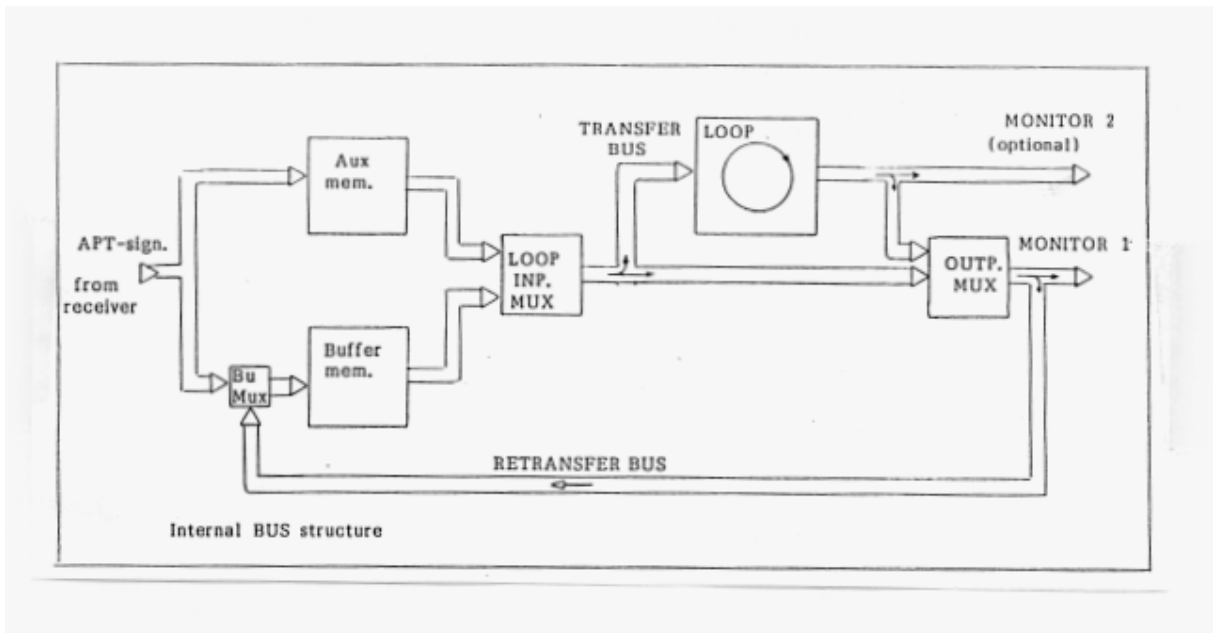


Figure 2-3: Internal Bus Structure of WSD-700

2.5 TABLE OF DISPLAY SELECTOR FUNCTIONS (Switch #5)

<i>DISPL.SEL</i> position	<i>Receiving signal</i> is written into	<i>MONITOR 1</i> will show	<i>TRANSFER</i> from ... to	<i>ReTRANSFER</i> from ... to
<i>Aux</i>	Aux MEMORY	Aux MEM.	Aux ... LOOP	
<i>Bu</i>	Bu MEMORY	Bu MEM.	Bu ... LOOP	Cleares Bu
<i>LOOP</i>	Bu MEMORY	LOOP MEM.	Bu ... LOOP	LOOP ... Bu
<i>Level</i>	Bu MEMORY	Level-Indicator	Bu ... LOOP	Cleares Bu
<i>GrSc</i>	Writes Greyscale	Greyscale	Cleares Bu	Grayscale. to Bu

Table 2-2: Display Selector Control Functions.

SECTION 3

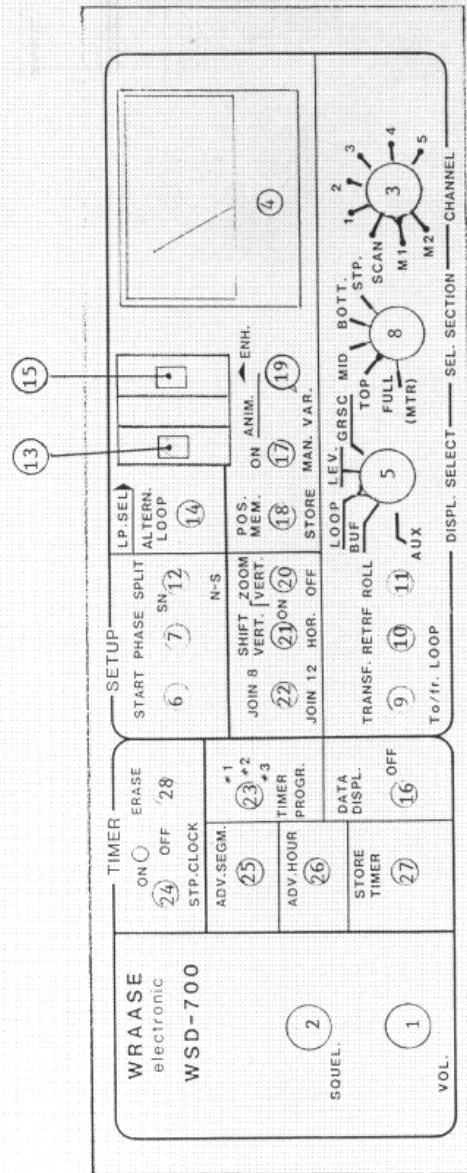
CONTROLS AND INDICATORS

3.1 FRONT PANEL CONTROLS AND INDICATORS

No.	TITLE	ASSIGNMENT
1.	VOL.	Adjusts volume of built-in speaker.
2.	SQUEL.	Used to reduce rushing noise while on scan mode.
3.	CHANNEL	Channel selector switch of built-in VHF receiver and satellite mode switch.
4.	0 - 100 %	Relative fieldstrength meter of built-in VHF receiver .
5.	DISPL. SELECT	Selects video signal to be displayed via rear connector „COL. MONIT.“ or „ALL MEMs“ . Selects also destination (Bu or Aux) for receiving signal and transfer/reftransfer source/destination.
6.	START	Manually starts reception into Buffer (Bu) or Auxiliary (Aux) memory.
7.	PHASE	Used to adjust image when automatic phasing is not set properly.
8.	SEL. SECTION	Selector switch for internally generated write-stop of input signal (preselects 512-line portion of 800-line picture to be stored) during geostationary satellite capture. Selects reception of IR, VIS or IR+VIS of NOAA-APT-signal during NOAA reception.
9.	TRANSF.	Transfers Bu- or Aux-memory contents to the loop memory indicated in the „MEM:xx“ -data line on the bottom of the screen.
10.	RETRF	Shifts pictures from loop memories to Buffer or from Aux-memory to Bu-memory.
11.	ROLL	Adjusts vertical position of Bu- and Aux-memory contents.
12.	SPLIT*SN*N-S	North-South/South-North reverse switch (turns pictures in Bu- and Aux-memory upside-down. Activates „Split-Screen-Mode“.
13.	LP. SEL.>	Selects one of sixteen user programmable loops.
14.	ALTERN. LOOP	Activates alternating loop display in 30 second intervals.
15.	ENH. ^	Selects one of sixteen enhancement/color curves to video outputs.
16.	DATA DISPL.	Activates on-screen alphanumeric data display of time and program data.
17.	ANIM. ON-MAN.	Manual/automatic loop animation selector switch.
18.	POS.MEM.-STORE	Used for programming loop display sequences. Increments loop memory and enters it into the present position.
19.	ANIM. VAR.	Adjusts speed of loop circulation.
20.	ZOOM	Activates 200% zoom on all loop memories.
21.	SHIFT	Shifts zoom window.
22.	JOIN8-*-JOIN12	Activates images joining mode for 8 or 12 images.
23.	TIMER PROGR.	Selects timer program memory bank 1, 2 or #3.
24.	TIMER ON	Activates automatic timer-controlled storage of pictures. Stops clock during programming procedure and synchronizes it to the correct time.
25.	ADV. SEGM.	Press to increment 4-minute segment by one.
26.	ADV. HOUR	Press to increment hour by one.
27.	STORE TIMER	Increments loop memory number for timer programming and enters it together with section (8) and channel (3) into timer program.
28.	ERASE	Clears program memory location. Clears entire memory bank if pressed together with ADV.HOUR.

Table 3-1: Assignment of Front Panel Controls and Indicators (Summary).

Figure 3-1: Front Panel Controls and Indicators.



3.2 REAR PANEL CONTROLS AND CONNECTORS

No.	TITLE	ASSIGNMENT
29	VIDEO 60-50 Hz	Selects 50Hz or 60Hz video frame rate on all video outputs.
30	BRIG.	Ajusts brightness of input signal (screwdriver operated/ 10 turns).
31	ON - OFF	Mains Power switch.
32	FUSEHOLDER	FUSE 0,25 A for 12V , supplies VHF receiver and converter.

Table 3-2: Rear Panel Controls.

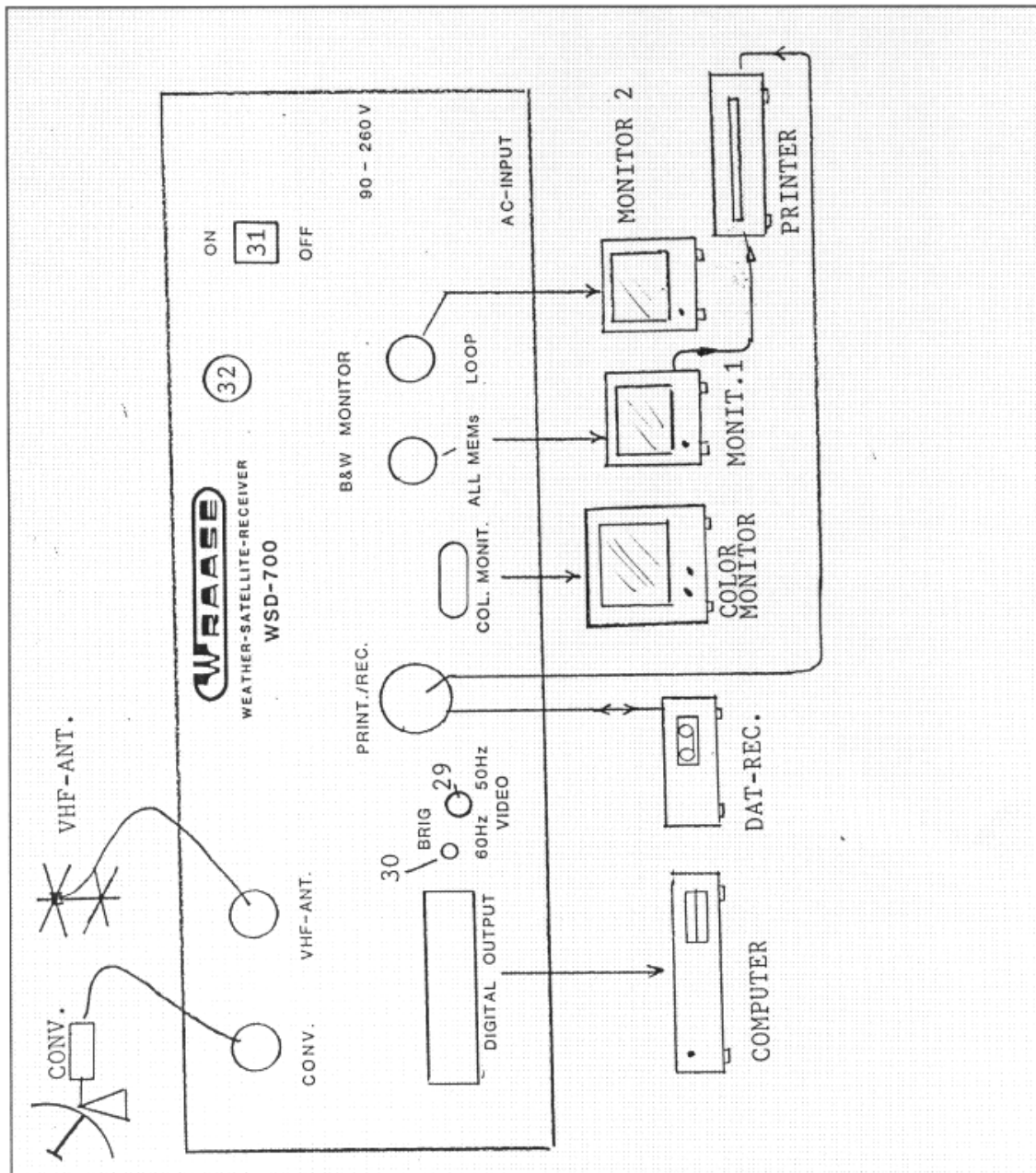


Figure 3-2: Rear Panel Controls and Connectors.

3.3 FRONT PANEL CONTROLS AND INDICATORS (IN DETAIL).

Page 9 shows all front panel operating controls and page 8 gives a short description of their use. More detailed information related to these controls is listed below:

1 „VOL.“ := *VOLUME*

Adjusts loudness of internal loudspeaker; does not affect picture quality.

2 „SQUEL.“ := *SQUELCH*

Used to reduce rushing noise while on scan mode. The squelch-circuit suppresses unwanted noise in absence of satellite signals. This control determines the squelch-threshold. The squelch will also control the operation of the frequency scanner.

3 „CHANNEL“; *rotary switch.*

Selects METEOSAT (Geostationary Sat.) or NOAA/METEOR (Polar Orbiting Sat.) receiving mode and frequency channel. During programming, the setting of the channel switch will be memorized for automatic METEOSAT channel switching. The following switch positions are provided:

M2 := METEOSAT Channel A2 = 1694.5 Mhz .

M1 := METEOSAT Channel A1 = 1691 Mhz.

SCAN := Automatic scanning of VHF-channels 1 through 5.

Note: Scanning will operate only if the squelch control is turned clockwise beyond the threshold where the noise is being cut-off. Scanning will stop automatically when a signal is being detected.

1 := VHF CHANNEL 137,500 MHz, NOAA -EVEN (-10, -12, -14).

2 := VHF CHANNEL 137,620 MHz, NOAA -ODD (-9).

3 := VHF CHANNEL 137,850 Mhz, METEOR.

4 := VHF CHANNEL 137,300 Mhz, METEOR.

5 := VHF CHANNEL 137,400 Mhz, METEOR/OKEAN.

Note: Availability of satellites on these channels may vary due to satellite failures and switch-off periods.

The next two positions „6“ and „7“ are not marked on the front panel, but do provide the following special functions:

6 := EXTERNAL , allows playback of recorded satellite images from DAT-recorder (digital audio tape).

7 := GMS ; Japanese G.M.S. - satellite reception on 1691 Mhz.
(GMS receive capability requires an optional module).

4 μA -METER

Indicates relative fieldstrength of satellite signal being received and shall be observed during dish- or Yagi-antenna adjustment to find the correct antenna direction to the satellite (Maximum meter reading).

5 „DISPL. SELECT“ : Display-Selector Rotary-Switch with 5 positions.

Controls several important memory-input/output functions:

- a) Selects images to be displayed via rear connectors „COL. MONIT.“ and „ALL MEMs“:

Aux := Auxiliary memory display.

Bu := Buffer memory display.

Loop := Display of LOOP memories (#1 ... 16).

Lev. := Level Indicator display (Oscilloscope).

GrSc := Grayscale generator display.

- b) Determines if **Aux** memory (switch position „Aux“) or **Buffer** memory (all other positions) is used for image capture (intermediate storage).

- c) Selects source for the TRANSFER function, operated either manually by pushbutton #9 or automatically by the timer program: In position „Aux“, AUX memory content will be transferred to the LOOP, in all other positions except „GrSc“, the content of Bu memory.

- d) Selects source and destination for the RETRANSFER function operated by pushbutton #10: In position „Bu“ and „Lev.“, the buffer will be cleared, in position „loop“, retransfer from the LOOP memories to Bu is possible, in position „GrSc“, the Grayscale-Testpattern will be copied into „Bu“.

A summary of the different functions of the Display Selector is given in Table 2-2.

6 „START“ ; pushbutton.

Pressing this button will manually start reception of pictures into BUFFER or AUX-memory (as selected by „Display Selector“ switch #5).

Note 1: Operating this pushbutton is only necessary to start capture of NOAA or METEOR -signals. When receiving METEOSAT/GOES or GMS, Start and Phasing is automatically executed upon receipt of the startsignal which is transmitted at the beginning of each image.

Note 2: When this button is being depressed for about 1 second, phasing (horizontal sync lock) is automatically executed by detecting the line sync burst, which is always present in the NOAA -signals. Once correctly started, the signal will not go out of phase during the full satellite pass, even if there are signal drop-outs.

7 „PHASE“ ; *pushbutton*

Used to adjust image when automatic phasing is not set properly. Press button until incoming lines are in correct horizontal position.

Note: Already received image portions cannot be corrected.

8 „SELECT SECTION “ ; *5-step rotary switch.*

The functions of this switch are different, depending on whether you receive a geostationary or a polar orbiting satellite. Due to the limited space on the front-panel the polar-orbiter functions could not be imprinted.

Functions during Geostationary Satellite Reception (METEOSAT):

Determines which 512-line section of the 800-line METEOSAT image will be captured.

Background-information: The television standard allows not more than 625 (525) lines to be displayed on the screen; therefore it is not possible to capture and display the full 800-line METEOSAT - Formats without loss in vertical resolution. During timer-programming, the setting of the „SEL. SECTION“ switch will be memorized for automatic acquisition of certain image sections.

Functions during Polar Orbiter Reception (NOAA/ METEOR):

Determines whether the IR (infrared), VIS (visual) or both NOAA-products will be captured and selects Russian METEOR mode (120 lines per minute).

Position	Geostationary Function	Polar Orbiter Function
FULL	The full METEOSAT format will be stored with a slight reduction in vertical resolution by dropping every third line.	MTR = METEOR mode is selected
TOP	The top section will be stored. (512 lines from start).	NOAA mode with both, IR and VIS capture (one in „Bu“, the other in „Aux“).
MID	The middle section will be stored.	NOAA-mode, IR only
BOT	The bottom section will be stored (512 lines to end).	NOAA-mode, VIS only
STP	Stops image capture.	Stops image capture.

Table 3-2: Functions of „Select Section“ switch #8.

9 „TRANSFER“ ; *pushbutton.*

Pressing this button will immediately transfer (copy) the content of the input memory (Aux or Bu) to the LOOP memory being selected (as indicated in the *Loop Composition Data Block*: „MEM. xx“). Input memory content will be

retained, so that multiple transfer operations to different LOOP memory locations are possible. Detailed information about transfer sources and destinations are given in *table 2.2*.

TRANSFER can be operated at any time without disturbing normal reception.

10 „RETRANSFER“ ; *pushbutton*.

Pressing this button will shift (copy) the image from the LOOP memory location being selected and indicated in the *Loop Composition Data Block* (MEM:XX) to Buffer memory. Switch #5 must be set to „LOOP“ for this.

The main purposes of the RETRANSFER FUNCTION are:

- a) To make LOOP memory content available through the digital output, which has direct access to Aux and Bu memory only.
- b) To reverse a picture being „upside-down“ in one of the LOOP memories, because reversal can only be achieved in Bu (or Aux) memory.
- c) To generate zoom factors higher than 200%.

11 „ROLL“ ; *pushbutton*.

Rotates Aux- and Bu- memory contents in the vertical direction.

Important note: Do not operate this button during image capture. Otherwise partly damage to the already received image section may result.

12 „SPLIT / SN / N - S“ (*South/North*) ; *3-position toggle switch*.

This switch controls two different functions:

1.) Rotates images in Bu and Aux by 180°. Shall be set according to the flight direction of the satellite during NOAA reception. During METEOSAT reception the S-N (middle)-position is used. This reversal switch can be operated at any time without disturbing normal reception.

Note: During transfer-operations the image will be transferred to the LOOP as selected by this switch. The switch does not directly affect the LOOP memories. Therefore, if the content of a LOOP memory must be reversed, it has to be retransferred to Bu memory, reversed and then to be transferred back to the old LOOP location (pushbuttons #9 and #10).

2.) Activates special „SPLIT-SCREEN“-mode (up-position) for viewing two different images or film loops on a divided screen (Especially for METEOSAT C03/D2).

13 „LP. SEL.>“ (*LOOP SELECT*); *16-position code switch*

Selects one of 16 user-programmable LOOPS.

The switch uses hexadecimal notation: A stands for 10, B for 11, C for 12, D for 13, E for 14, F for 15.

Note: A LOOP is an arrangement of a certain number of image memories in a special order.

14 „ALTERNATE LOOP“; toggle switch.

When in the up-position, automatic switching between two film loops takes place in 30 second intervals.

Note: A LOOP is an arrangement of a certain number of image memories in a special order. 16 such LOOPS can be universally arranged (programmed) and will be called up at the **LP. SEL.** switch (13).

The following Loop Numbers will be alternating:

If an even number is selected on switch #13, there will be an alternating display of that and the next higher odd loop number; if an odd number is selected there will be an alternation between that and the next lower even loop number.

Example:

Switch #13 in pos.	Alternating LOOPS
„0“ or „1“	0 and 1
„2“ or „3“	2 and 3
...	...
„A“ or „B“	A and B
„C“ or „D“	C and D

15 „ENH.“ = *ENHANCER*; 16-position code switch.

Selects one of 16 Enhancement/Colour curves applied to „ALL. MEMs“ and „COL. MONIT.“ video outputs. Positions: 0,1,2,3,4,5,6,7,8,9,A,B,C,D, E, F. The switch uses hexadecimal notation: A stands for 10, B for 11, C for 12, D for 13, E for 14, F for 15. In the standard system configuration, the selected enhancement curve will also be applied to the „LOOP“ video output. However, upon request, a separate switch is optional available controlling only the enhancement of the „LOOP“ video output with individual enhancement curves.

16 „DATA DISPLAY“; 3-position toggle switch.

Activates on-screen alphanumeric DATA DISPLAY.

Two blocks of information are available, the Timer Info Line (TIL) and the Loop Composition Data Block (LCDB).

3 POSITIONS:

„off“ (middle position) := DATA DISPLAY is switched **off**

Up-Position := Full DATA DISPLAY:

On screen top: *Timer Info Line (TIL)*.

On bottom: *Loop Composition Data Block (LCDB)*.

Down-Position := *Loop Composition Data Block (LCDB)* only.

The Timer Info Line (TIL) displays the current time (UT) and timer program memory data and has the following structure:

*UT=12:A * MEM. 15 * F * CH 1 *			
Current time UT, first 2 digits are the hour, last digit is 4-minute segment as hex number.	LOOP MEMORY No. being programmed to store the image which is just being received. 00 = Not programmed.	F, T, M, B Indicates image sector to be stored: Full, Top, Mid, or Bottom.	METEOSAT Channel No. 1 or No. 2.

Due to the METEOSAT formats being transmitted in 4-minute-intervals, only 4-minute-segments of the hour are used and displayed as a hexadecimal number: 0,1,2,3,4,5,6,7,8,9,A,B,C,D,E. 0 stands for the first METEOSAT format transmitted at 2 minutes after the full hour, 1 stands for the second image starting at 6 minutes after the hour, etc.

Then follows „MEM.XX“ indicating which LOOP MEMORY LOCATION is programmed to store the image being received at the indicated time. Numbers 1 to 16 are possible. If „MEM.00“ is shown, no automatic storage is programmed. If „MEM.=>“ is indicated, automatic printing is programmed.

The next display to the right shows either *F*, *T*, *M* or *B*, indicating which portion of the METEOSAT image will be stored, the full format (F), the top (T), the middle (M) or the bottom section (B).

The rightmost display shows either *CH1* or *CH2* indicating the programmed METEOSAT Channel number.

Note, that the image segment and channel display is meaningless as long as the MEMORY-No.- DISPLAY in the TIL shows „MEM. 00“.

The LOOP COMPOSITION DATA BLOCK (LCDB) has the following structure:

12:A -->Current time (same as in TIMER INFO LINE). The time display is repeated for convenience only (TIL may be switched off).

POS : XX -->Actual LOOP POSITION number (XX = 01..16).

MEM : XX -->LOOP MEMORY LOCATION being programmed at the above LOOP-position and displayed on the monitor (XX = 01..16).

17 „ANIM.: ON - > MAN“ ; 3 -position toggle switch.

Will be used to manually step through a LOOP sequence or to activate automatic loop circulation. Also during programming of LOOP display sequences.

Flipping the toggle down („MAN.“) will increment the LOOP POSITION. 16 LOOP POSITIONS, indicated by the number following „POS:“ in the Loop Composition Data Block (LCDB), can be associated with any LOOP MEMORY LOCATION, indicated by the number following „MEM:“ in the LCDB.

In the up-position („ON“) , automatic incrementation of the position counter is activated which produces an animated display. Animation speed can be varied with knob #19 („VAR.“).

18) „POS. MEM. - STORE“; *pushbutton*.

Pressing this button increments the LOOP MEMORY NUMBER and programs it at the present LOOP POSITION. The result can be observed in the Loop Composition Data Block (LCDB).

The loop can be limited to any length shorter than 16 steps by setting the => symbol into the next higher position.

Note 1 : **Manual** TRANSFER takes place into the LOOP MEMORY LOCATION indicated in the LCDB :“MEM.XX“.

Note 2: 16 different animation sequences (Loops) can be programmed, selectable by switch #13.

Practically, it is recommended to use the following procedure:

Step to the desired LOOP POSITION with switch #16 watching the LCDB „POS.XX“ , then press button #18 until the desired memory number appears in „MEM:XX“ ,which completes programming of this POSITION.

19) „ANIM.. / VAR.“, *Control knob*

Adjusts speed of loop circulation. Turning the knob clockwise will increase the speed . Animation is achieved by scanning the POSITIONS 1 ...16 and displaying the memories associated with them (Switch #16 set to „ON“).

Note: The following preparations must be completed before an animated loop can be displayed:

- a.) Several images of the same geographical area taken at different times must be stored in certain loop memories.
- b.) At least one Loop Display Sequence for those image memories must have been programmed using switch #17 and button #18.

20) „ZOOM : VERT. - ON - „ ; *toggle switch, 3 positions*.

Activates a 200% ZOOM on all *LOOP* memories.

„VERT.“ (Up-position) : Zoom works only in vertical direction, i.e. images are vertically stretched (advantageous for regions close to the Poles).

„ON“ (Middle position) : Full Zoom is on (hor. and vert.).

„OFF“ (Down position) : Zoom is switched off.

Note: Switch #21 allows to shift the zoomed window over the full image area.

21 „*SHIFT: VERT. - HOR*“; *Flipping toggle switch.*

Used to horizontally and vertically move the zoom-window over the stored image in order to select the desired viewing area.

22 „*JOIN 8 - JOIN 12*“; *3-position toggle switch.*

Used to activate the *image-joining special mode*. Image-joining allows to horizontally join two separate METEOSAT images so that their borders meet in the center of the screen.

„JOIN8“ (up-position) : Image joining is active for Loop images 1 thru 8.
The remaining memories will be displayed as usual.

Middle position : Image joining is switched off.

„JOIN12“ (down-position) : Image joining is active for Loop images 1 thru 12.
The remaining memories will be displayed as usual.

23 „*TIMER PROGR.. #1, #2, #3*“; *toggle switch, 3 positions.*

Selects timer program memory bank 1, 2 or 3. The timer program memory consists of 3 independent memory banks of 360 bytes each. 360 bytes are sufficient to program one complete 24h cycle ($24 \times 15 = 360$).

Note: You can prepare 3 different timer-programs for different applications, e.g. one for winter, another for summer.

24 „*TIMER ON - OFF - STP. CLOCK*“; *3-position toggle switch.*

Activates automatic, timer controlled storage of METEOSAT images. Stops clock during programming and clock-setting procedures.

In the „TIMER ON“ position (red light) the system is controlled by the timer programm, however, the timer will only become active during time intervals with a stored Loop memory destination (not just „MEM. 00“ in the TIL).

Normal manual operation of the system is possible in between timer-active intervals.

In the middle position („OFF“), the timer is disabled, but the clock will continue normal operation.

In the down-position „STP. CLOCK“, the clock is stopped for time setting or interruption during extensive programming.

25 „*ADV. SEGM.*“; *pushbutton (advance segment).*

Press to increment 4-minute-segments.

26 „ADV. HOUR“; *pushbutton (advance hour).*

Press to increment hour.

27 „STORE TIMER“; *pushbutton.*

Stores a loop memory number in the selected timer program as destination for automatic storage at the time being displayed in the TIL (=Timer Info Line). The number will be incremented each time the button is being depressed, therefore it may be necessary to press the button repeatedly in order to reach the desired memory: Only the last entry (memory number shown in the TIL) will be relevant. Beside the memory location, the METEOSAT *channel number* and the *image section* will be memorized and displayed in the TIL, therefore the switches #3 („CHANNEL“) and #8 („SEL. SECTION“) must be set to the desired position prior to operating the „STORE TIMER“ button. Any entry can be erased by pressing the ERASE-button #27 (sets „MEM.“ in the TIL to 00).

Note: The timer will „not do anything“ unless the TIL indicates a memory number different from zero. The ==>-Symbol in the TIL activates automatic printing without storing the image in a loop memory.

28 „ERASE“ ; *pushbutton.*

Erases a timer memory location (= time segment), i.e. sets „MEM.“ in the TIL to „00“. For erasing the entire program memory bank, press „ERASE“ together with „ADV. HOUR“ for at least 1 second.

Note: Before you enter a new 24h-program, erase the entire 24h-memory to make sure that there are no unwanted entries left.

3.4 REAR PANEL CONTROLS (see page 10)

29 „ 60 / 50 Hz VIDEO “; *2-position toggle switch.*

Selects 50 Hz or 60 Hz video signal on all video outputs. In order to get a flicker-free display, 60 Hz should be selected. However, if external video equipment like video recorders or printers shall be used, the 50 Hz-position may be necessary.

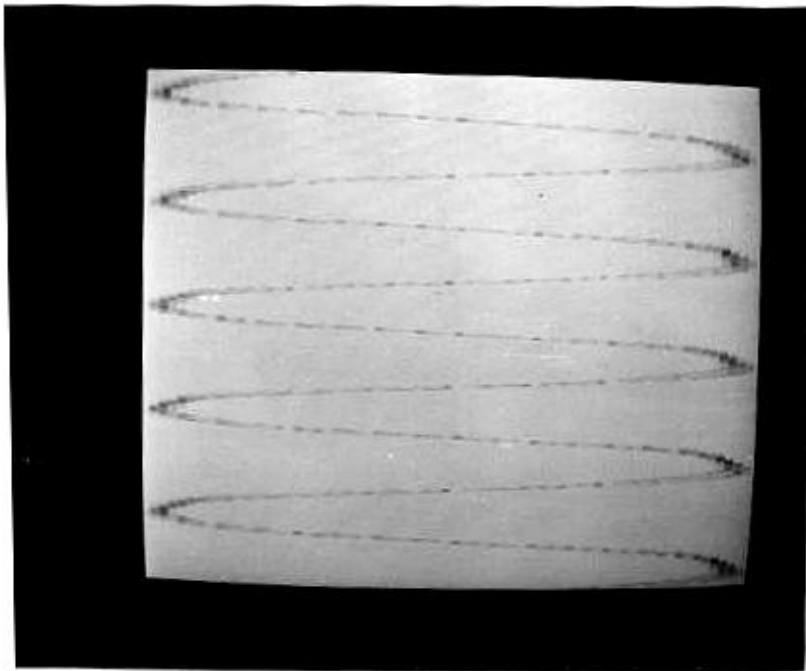
Note for users of the P66 or similar printer: The printer can operate on either 60 or 50Hz video sources (rear panel switchable). However, on the 60Hz mode, several lines at the top of the picture will not be printed, whereas in the 50 Hz mode (625 lines) the picture will be printed without loss of information.

30 „BRIG.“ („*Brightness*“); *screwdriver adjustable 10-turns-control.*

Adjusts brightness of input signal

There is normally no need to modify the setting of the brightness control. However, due to temperature variations and aging of the equipment, the necessity to adjust it may occur. For easy checking proper adjustment, a LEVEL INDICATOR video-display is provided: Set the „Display Selector“ switch #5 to „Level-Indic.“ During reception of the METEOSAT Start- or Stop-tone, the displayed sine wave should just fill the full picture area without having flat tops. If this is not the case, adjust the brightness control until such a curve is achieved.

Note: The correct setting of the *brightness* is essential for correct auto-start and phasing of the METEOSAT images.



SECTION 4

OPERATING THE WSD-700

The Operation of the **WSD-700** system is accomplished by using the controls located on the **WSD-700** front panel. *Figure 3-1* provides a drawing of the front panel controls and indicators. A summary of the functions of the controls is shown in *Table 3-1*. A detailed description of the controls including some background information is given in Chapter 3.3.

4.1 RECEIVING IMAGES (Manual Mode)

The **WSD-700** system has the capability of receiving imagery from geostationary and polar orbiting weather satellites. Imagery is received in either buffer or auxiliary memory. Normally, buffer memory is used to capture an image. Using the transfer function, the contents of either buffer or auxiliary memory is moved to one of sixteen loop memory locations. (From these locations, the imagery can be displayed. This function is described in Section 4.2).

4.1.1 GEOSTATIONARY SATELLITE (Manual Mode)

The **WSD-700** system can receive imagery from geostationary satellites, including METEOSAT, GOES, and Japanese GMS. Image capture can be manual or automatic. Follow the steps listed below to manually receive imagery. (Automatic processing is discussed in Section 4.3). The numbers in parentheses below refer to the controls and indicators labeled in *Figure 3-1*. Steps 1 through 5 have to be set only once to prepare the system for manual operation.

1. Set **TIMER** (24) to **off**, which is the middle position. The LED does not light.
2. Set **LP. SEL.** (13) to **F** (or any other unused, i.e. unprogrammed position).
3. Set **ALTERN. LOOP** (14) to the **down** position (off).
4. Set **JOIN8-*-JOIN12** (22) to the **middle** position (off).
5. Set **ANIM. ON-* - MAN.** (17) to the **middle** position (off).
6. Set **DATA DISPL.** (16) to the **down** position to display the **LOOP COMPOSITION DATA BLOCK**, (LCDB).
7. Set **CHANNEL** (3) to **M1** for GOES, **M1** or **M2** for METEOSAT, depending on whether the main channel 1691.0 MHz, or the additional channel on 1694.5 MHz is desired; for Japanese GMS satellites, move **CHANNEL** (3) clockwise to the end position.
8. Set **DISPL. SELECT** (5) to the desired input memory; normally **Bu** (buffer).
9. Set **SEL. SECTION** (8) to **FULL** if the entire image is needed. The geostationary images are 800-line pictures; the **WSD-700** can store 512 lines. Five options are available at **SEL. SECTION** (8): **FULL**, **TOP**, **MID**, **BOT.**, **STP** (see Chapter 3.3). Select the option which meets your requirement.
10. Set **SN-NS** (12) to **SN** (middle position) when receiving METEOSAT, **N-S** when receiving GOES.

11. Verify the received signal using the relative fieldstrength meter and monitoring the speaker. Rel. Fieldstrength (4) should read 50% or greater and the signal should sound clear and noise-free (GMS will indicate only about 20%).
12. The imagery is transmitted continuously and displayed on MONITOR 1. Each new image erases and replaces the old image, line by line. (Satellite Dissemination Schedules provide information about transmission time and image products).
13. To manually move the imagery captured in buffer memory to loop memory, switch to the desired memory location by repeatedly pressing **POS. MEM. STORE** (18) (memory location number is displayed in the bottom of the LOOP COMPOSITION DATA BLOCK as „**MEM: xx**“). Push the **TRANSF.** button (9) to move the image. Correct image transfer may be verified on the second monitor, connected to the „LOOP“ video output, or, if only one monitor is used, by setting **DISPL. SELECT** (5) to **LOOP**.

Notes and Hints:

MANUAL transfer can be released at any time, and the picture will be copied as it is in this moment. **Manual** transfer always takes place into the loop memory location indicated in the **bottom** data line as „**MEM : XX**“.

Even if in automatic mode (**TIMER** switched ON / LED lights), manual capture of geostationary or polar orbiter imagery is possible in between programmed time intervals (programmed images will not be lost because the timer has priority).

The **WSD-700** does not detect the Stopsignal transmitted at the end of each geostationary satellite image. Instead, an internal counter counts the lines received after start, and stops capture automatically according to the setting of the **SEL. SECTION** switch (8).

4.1.2 POLAR ORBITING SATELLITE

Polar orbiting satellites are frequently outside the line of sight of the VHF channels. The **WSD-700** can scan the five VHF channels on a rotating basis. A variable squelch circuit reduces rushing noise while on scan mode. When a signal is detected on one of the channels, the scanner stops on that channel, and the APT signal can be heard through the loudspeaker. The operator should manually move the **CHANNEL** switch (3) to the channel number receiving the signal, according to the steps listed below. *Table 4-1* lists the signal and frequency assigned to each polar orbiter step on the **CHANNEL** switch (3).

ASSIGNMENT	SOURCE	FREQUENCY (MHz)	REMARKS
SCAN	SCANNING VHF	(VHF-CH. 1 -5)	
1	NOAA-ODD	137,500	
2	NOAA-EVEN	137,620	
3	METEOR	137,850	
4	METEOR	137,300	
5	METEOR/OKEAN	137,400	

Table 4-1: Polar Orbiter Satellite Receiver Frequency and Signal, assigned to CHANNEL- switch(3).

Follow the steps listed below to obtain a signal from the polar orbiting weather satellites. (Steps 1 through 6 have to be set only once to prepare the system for manual mode and are equal for manual capture of geostationary satellites):

1. Set **TIMER** (24) to **off**, which is the middle position. The LED (24A) does not light. (See Note 1).
2. Set **LP. SEL.** (13) to **F** (or any other unused, i.e. unprogrammed, position).
3. Set **ALTERN. LOOP** (14) to the **down** position (off).
4. Set **JOIN8-M-JOIN12** (22) to the **middle** position (off).
5. Set **ANIM. ON - MAN.** (17) to the **middle** position (off).
6. Set **DATA DISPL.** (16) to the **down** position, which activates display of the LOOP COMPOSITION DATA BLOCK, (LCDB).
.....
7. Set **CHANNEL** (3) to **SCAN**.
8. Set the **SQUELCH** control knob (2) clockwise beyond the squelch threshold.
9. Set **DISPL. SELECT** (5) to **BU** (Buffer).
10. Set **SEL. SECTION** (8) to **MTR** if a Russian METEOR satellite is expected, for NOAA select **TOP** (See Note 2).
11. Monitor the speaker, which is quiet until a signal is detected on one of the channels. When a signal detection occurs, the scanner stops on that channel and the APT signal can be heard through the loudspeaker.
12. Move the **CHANNEL** (3) to positions **1** through **5** to lock onto the satellite. Wait until a noise-free tone is heard. Press the **START** (6) button for approximately one second. For Russian METEOR satellite, press **START** (6) button, then press the **PHASE** (7) button until the image is properly aligned on the monitor.
13. Set **SN / N-S** (12) according to the expected satellite passing direction, (South to North = middle position). If the wrong selection has been made, the selection can be changed without damage to already received image information.
14. The data are received continuously, as long as the satellite remains in the line of sight. To move the imagery captured in buffer and auxiliary memory to loop memory, switch to the desired loop memory location by repeatedly pressing **POS.MEM.-STORE** (18) until the desired number appears in the bottom data line „**MEM: xx**“. Push the **TRANF.** (9) button to move the image. If more than one screen of image data shall be retained, distribute the screens to several loop memory locations, using the above procedure.

15. Correct image transfer may be verified on the second monitor, connected to the „LOOP“ video output, or -if only one monitor is used- by setting **DISPL. SELECT** (5) to **LOOP**.
16. As soon as the desired part of the satellite pass has been received, capture may be stopped by moving **SEL. SECTION**(8) to **STP.** and **back** to the previous position.

Note 1 (Refers to step 1):

Manual capture of polar orbiting satellite imagery is possible even if automatic capture of geostationary imagery is activated (**TIMER** set to **ON**). However, if a time-collision occurs, the geostationary timer will have priority and the system will automatically leave the polar orbiter mode, capture the geostationary image as programmed and return to manual mode. If such collision occurs, and you prefer to receive the polar orbiter image instead of the geostationary, set **TIMER** to **OFF** (middle position) during capture of this specific orbiter image.

Note 2 (Refers to step 10).

The other possible selections during NOAA capture are listed in *Table 3-2* on page 13. However, „TOP“ is most advantageous, because IR and VIS are simultaneously captured and can be compared by changing **DISPL. SELECT** (8) from **BUF** to **Aux** (this can be done even during ongoing image capture!).

4.2 DISPLAYING IMAGES

4.2.1 GENERAL

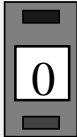






Imagery may be displayed on either Monitor 1 , Monitor 2 or the printer. Monitor 1 may be a color monitor connected to the 9-pin D-sub-connector assigned „COL. MONITOR“ or a black&white monitor connected to the „ALL MEMs“ BNC-jack. Monitor 2 is connected to the BNC-jack assigned „LOOP“. Monitor 2 can display only what is in the loop memory. Monitor 1 and the printer can display any image selected on the display selector switch (5).

Always select the desired, best suitable Enhancement/Color at the **ENH.** switch (15).

4.2.2 DISPLAYING LOOP MEMORIES

Loop memories can be arranged in **arrays** to create an animated film display. Such arrays can consist of any number of loop memories between one and sixteen, and can be arranged in any order. Sixteen such arrays (loops) can be universally programmed and called-up at **LP. SEL.**-switch (13).

The loop memories will normally be filled up automatically with images according to the timer clock program. Independent of the order programmed in the timer, any other order can be chosen for loop display. Normally, the order in which the images are displayed, will be the order of their capture. However, sometimes it is desirable to alter the original sequence, e.g. for elongated display of specific images, for dropping images for a condensed display or for producing a reversed or shuttling display of the weather process. The structure of the **WSD-700** allows free composition of sixteen loops (= loop memory scanning sequences) by the user.

LP. SEL.(13)	On each position of „LP.SEL.“(13) a different loop can be programmed, which scans a certain number of loop memory locations in a specific order. These are only examples .																																		
	<table><tr><td>POS:</td><td>01</td><td>02</td><td>03</td><td>04</td><td>05</td><td>06</td><td>07</td><td>08</td><td>09</td><td>10</td><td>11</td><td>12</td><td>13</td><td>14</td><td>15</td><td>16</td></tr><tr><td>MEM:</td><td>01</td><td>02</td><td>03</td><td>04</td><td>05</td><td>06</td><td>07</td><td>08</td><td>09</td><td>10</td><td>11</td><td>12</td><td>13</td><td>14</td><td>15</td><td>16</td></tr></table> <p>Display loop memories 1 through 16 as a loop.</p>	POS:	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	MEM:	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16
POS:	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16																			
MEM:	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16																			
	<table><tr><td>POS:</td><td>01</td><td>02</td><td>03</td><td>04</td><td>05</td><td>06</td><td>07</td><td>08</td><td>09</td><td>10</td><td>11</td><td>12</td><td>13</td><td>14</td><td>15</td><td>16</td></tr><tr><td>MEM:</td><td>02</td><td>04</td><td>06</td><td>08</td><td>10</td><td>12</td><td>14</td><td>=></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr></table> <p>Display 2,4,6,8,10,12,14 as a loop.</p>	POS:	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	MEM:	02	04	06	08	10	12	14	=>								
POS:	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16																			
MEM:	02	04	06	08	10	12	14	=>																											
	<table><tr><td>POS:</td><td>01</td><td>02</td><td>03</td><td>04</td><td>05</td><td>06</td><td>07</td><td>08</td><td>09</td><td>10</td><td>11</td><td>12</td><td>13</td><td>14</td><td>15</td><td>16</td></tr><tr><td>MEM:</td><td>01</td><td>02</td><td>03</td><td>04</td><td>05</td><td>06</td><td>07</td><td>08</td><td>=></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr></table> <p>Display loop memories 1 through 8 as a loop.</p>	POS:	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	MEM:	01	02	03	04	05	06	07	08	=>							
POS:	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16																			
MEM:	01	02	03	04	05	06	07	08	=>																										
	<table><tr><td>POS:</td><td>01</td><td>02</td><td>03</td><td>04</td><td>05</td><td>06</td><td>07</td><td>08</td><td>09</td><td>10</td><td>11</td><td>12</td><td>13</td><td>14</td><td>15</td><td>16</td></tr><tr><td>MEM:</td><td>01</td><td>03</td><td>05</td><td>05</td><td>07</td><td>09</td><td>11</td><td>=></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr></table> <p>Display loop memories 1,3,5,7,9,11 with elongated display of 5.</p>	POS:	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	MEM:	01	03	05	05	07	09	11	=>								
POS:	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16																			
MEM:	01	03	05	05	07	09	11	=>																											
	<table><tr><td>POS:</td><td>01</td><td>02</td><td>03</td><td>04</td><td>05</td><td>06</td><td>07</td><td>08</td><td>09</td><td>10</td><td>11</td><td>12</td><td>13</td><td>14</td><td>15</td><td>16</td></tr><tr><td>MEM:</td><td>08</td><td>02</td><td>04</td><td>06</td><td>06</td><td>04</td><td>02</td><td>=></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr></table> <p>Display 2,4,6,8 as forwards-backwards animation with 6 being the last image.</p>	POS:	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	MEM:	08	02	04	06	06	04	02	=>								
POS:	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16																			
MEM:	08	02	04	06	06	04	02	=>																											
• • •	• • •																																		
	<table><tr><td>POS:</td><td>01</td><td>02</td><td>03</td><td>04</td><td>05</td><td>06</td><td>07</td><td>08</td><td>09</td><td>10</td><td>11</td><td>12</td><td>13</td><td>14</td><td>15</td><td>16</td></tr><tr><td>MEM:</td><td>01</td><td>02</td><td>03</td><td>04</td><td>05</td><td>06</td><td>07</td><td>08</td><td>09</td><td>10</td><td>11</td><td>12</td><td>=></td><td></td><td></td><td></td></tr></table> <p>Display 1 through 12 as a loop.</p>	POS:	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	MEM:	01	02	03	04	05	06	07	08	09	10	11	12	=>			
POS:	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16																			
MEM:	01	02	03	04	05	06	07	08	09	10	11	12	=>																						
	<table><tr><td>POS:</td><td>01</td><td>02</td><td>03</td><td>04</td><td>05</td><td>06</td><td>07</td><td>08</td><td>09</td><td>10</td><td>11</td><td>12</td><td>13</td><td>14</td><td>15</td><td>16</td></tr><tr><td>MEM:</td><td>13</td><td>16</td><td>=></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr></table> <p>Display memory 13 and 16 as a loop.</p>	POS:	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	MEM:	13	16	=>													
POS:	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16																			
MEM:	13	16	=>																																

Note: Empty boxes = Don't care

Table 4-2: LP. SEL. switch (13) control functions. The programs in the right column are examples.

4.2.3 PROGRAMMING A LOOP-MEMORY ARRAY FOR DISPLAY

A maximum of 16 Array-POSITIONS are provided. For display, these positions will always be scanned in the natural sequence 1,2,3,4,...16. To each position any loop image memory location (1 ... 16) can be associated. Setting the "=>"-symbol into a position will truncate the loop back to the beginning.

The information needed during programming of loop memory arrays is displayed in the LOOP COMPOSITION DATA BLOCK (LCDB). The active position is indicated at „POS:xx“, the active loop memory location is indicated below at „MEM:xx“.

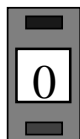
Note that Monitor 2 always displays the image in the loop memory location indicated at „MEM:xx“ in the LCDB.

Use the following procedure for programming such a loop-memory scanning sequence:

1. Set **ALTERN. LOOP** (14) to the down position (off).
2. Set **DATA DISPL.** (16) to the down position (LCDB is on).
3. Move **LP. SEL.** (13) to the loop number you have decided to use for the array you are going to program.
4. Switch to „**POS:01**“ with **ANIM. ON-MAN.** (17) by flipping down.
5. Repeatedly press **POS. MEM. STORE** (18) until you have reached to desired loop memory location, indicated in the LCDB „**MEM:xx**“.
6. Switch to the next position (switch 17)
7. Continue with steps 5 and 6 until you have programmed the last position.
8. If your last position was not 16, i.e. your loop sequence shall have less than 16 steps, switch to the next position and press **POS. MEM. STORE** (18) until „**MEM: =>**“ is indicated (the following positions can be neglected).

4.2.4 MANUAL DISPLAY

For your convenience during manual display of loop images, it is recommended to create an array which associates memory 1 to position 1, memory 2 to position 2 and so on, like this:



POS:	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16
MEM:	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16

LOOP COMPOSITION DATA BLOCK (LCDB)

LP. SEL.(13)

The display and selection of imagery stored in loop memory is then accomplished by flipping down **ANIM.-MAN.** (17).

If such programmed array is not available, set **LP.SEL.**(13) to an unused position and press **POS.MEM. STORE** (18) until you have reached to desired loop memory (indicated in the LCDB „MEM: xx“).

4.2.5 AUTOMATIC LOOP DISPLAY

To start automatic scanning of the loop selected at **LP.SEL.**(13), set **ANIM. ON-MAN.**(17) to **ON**. Set the scanning speed from 0.5 to 5 pictures per second by turning the **ANIM.VAR.** knob (19).

4.2.6 DISPLAY ON THE PRINTER (*Manual mode*)

The optional printer prints the image which is displayed on Monitor 1. Printing is accomplished by the following procedure:

1. Display the desired image on **Monitor 1** using the procedure described above.
2. Press the **Print** button on the printer.

Automatic printing is described in paragraph 4.3.4..

4.3 AUTOMATIC PROCESSING

The automatic mode of operation allows the receipt of geostationary-satellite-produced imagery without operator intervention. Polar-orbiter-produced imagery can be automatically recorded on an optional DAT recorder for later manual display.

The automatic function can be divided into two parts: Preparation (programming), covered in Chapter 4.3.2 , and Reception (Chapter 4.3.3).

4.3.1 GENERAL

4.3.1.1 PROGRAMMABLE CLOCK TIMER; *Principle of Operation.*

Automatic processing in the **WSD-700** is achieved by means of a 24h-Programmable Timer. A specialty of the timer is, that it divides each hour into 15 intervals (segments), each 4 minutes long. These segments exactly correspond to the METEOSAT image transmission scheme so that the timer-clock can run in synchronisation with the METEOSAT-schedule. Programming becomes very quick and easy, because each time-segment represents exactly one METEOSAT image slot and no start- or stoptimes have to be observed. There are a total of 360 time-segments (24 hours at 15 each).

Each time segment represents a program memory location which holds the information necessary for automatic image capture (Loop memory no., image section, receiver channel). Three program memory banks are provided and can be selected at the switch **TIMER PROGR.** (23) so that different programs can be prepared for different applications or seasons. *Table 4-4* illustrates the available programmable memory space in the timer.

4.3.1.2 *TIME DISPLAY FORMAT and TIMER INFO LINE (TIL)*

The on-screen time-display is available in the Timer Info Line (TIL), which can be activated at switch **DATA DISPL.** (16). For convenience, the time-display is duplicated in the Loop Composition Data Block (LCDB). The *Table 4-3* to the right illustrates the format of the time display: The first two digits represent the hour, the third digit is the segment in hexadecimal notation. **Example:** 12:E represents the time segment from 12:58 to 13:02 (Europe-IR „D2“ image format in the current METEOSAT schedule).

The timer is directly coupled with the program memory, i.e. each combination of the three clock-digits in the TIL represents a timer program memory location, the contents of which is indicated in the next following data spaces of the TIL. Three pieces of information are stored in each program memory location:

1. The LOOP MEMORY LOCATION (1...16) for auto-storage (all loop memory locations can be individually accessed by the timer program) or the print command..
2. The Image Section : Full (F), Top (T), Mid (M), Bottom (B).
3. The METEOSAT Channel : CH1 or CH2.

For further information about the TIL, see chapter 3.3.

4.3.2 *PREPARING AUTOMATIC PROCESSING*

4.3.2.1 *PROGRAMMING the TIMER*

Before you start programming, it is recommended that you prepare a program listing. Blank forms are provided at the end of this book.

Take the following steps to prepare the **WSD-700** to automatically receive images:

1. Activate the Timer Info Line (TIL) by moving **DATA DISPL.**(16) to the up-position.
2. Stop the clock by setting **TIMER** (24) to STP.CLOCK.
3. Set **TIMER PROGR.** (23) to the desired program memory bank 1, 2 or #3.
4. Press **ERASE** (28) and **ADV.HOUR** (26) simultaneously for approximately one second to clear program memory.

METEOSAT-IMAGE STARTING AT ... (Minutes after whole hour)	WSD-700 SEGMENT- DISPLAY
02	:0
06	:1
10	:2
14	:3
18	:4
22	:5
26	:6
30	:7
34	:8
38	:9
42	:A
46	:B
50	:C
54	:D
58	:E

Table 4-3 : Segment Display

5. Select the segment by depressing the **ADV.SEGM.** button (25) until the desired segment is displayed.
6. Select the hour by depressing the **ADV.HOUR** button (26) until the desired hour is displayed.
7. Set **CHANNEL** (3) to either M1 or M2.
8. Set **SEL.SECTION** (8) for the image section desired. If you are not certain, chose FULL.
9. Press **STORE TIMER** (27) repeatedly until the desired loop memory is indicated in the TIL. If only auto-printing is desired, step to the „=>“-symbol (appears after MEM.16).
10. Verify correct programming of loop memory, section and channel by checking the TIL-display.
11. Begin the next segment to be programmed (repeat step 5 through 11). If none, synchronize the clock as described in paragraph 4.3.2.2 and move segments and hours so that the the current time-segment is displayed (GMT).

Notes:

Step 2 in the above procedure disconnects the 4-minute clock pulses from the main timer circuit. This is recommended to avoid unwanted incrementation of the segment display during extensive programming. However, if only short programs or program modifications are entered, stopping the clock may not be necessary and a new synchronisation after programming can be avoided. Only moving the display to the current time segment after programming remains to be done. In other words: Moving the hours and the segments and pressing STORE TIMER does not affect synchronisation.

The clock and timer program memory are supplied with power from a NiCad-back-up battery, when the **WSD-700** is disconnected from mains power.

Individual segments can be erased by pressing the **ERASE** button (28).

All timer-segments which indicate „**MEM. 00**“ in the TIL are **passive** (erased) and will not cause any actions by the timer, even if certain sections (F,T,M or B) and channels are indicated in the TIL.

It is not necessary to program the time segments in a special order. Depending on the kind of program you designed, you can chose the most efficient procedure. Programming a loop of images being regularly transmitted every hour into successive memories, requires only to set the segment once and then press STORE TIMER and ADV.HOUR alternatingly until the end of the loop is reached (or 24 hrs are programmed).

The number of memories used for a 24h-loop must be a submultiple of 24 (12, 8, 6, 4, 2) to achieve a continuous display.

The „=>“-symbol has different meanings in the TIL and in the LCDB. In the TIL it is used to indicate automatic printing, in the LCDB it is used to truncate the loop display to the beginning.

4.3.2.2 SYNCHRONIZING THE CLOCK

The accuracy of the timer clock is about +/- 5 seconds per week. Check the accuracy of the time display at least every three weeks, and correct it if necessary. For the METEOSAT, set the clock so that the segment display advances to the middle of the 27-second pause between the image transmissions. Follow these procedures:

1. Stop the clock by lowering the **TIMER** (24) switch to STP. CLOCK.
2. Identify the stop signal for the current METEOSAT transmission.
3. Fifteen seconds after the stop signal, set the **TIMER** (24) switch to the middle position.
4. Move segments (25) and hours (26) so that the current time segment is displayed.

Note: The above procedure is always necessary before you return to automatic capture after the **TIMER** switch (24) has been set to the STP.CLOCK position for extensive programming. If the Timer switch (24) was kept in the middle position during programming, only step 4 is necessary.

4.3.2.3 ERASING A TIMER PROGRAM MEMORY LOCATION (SEGMENT)

1. Move to the time display to be erased by repeatedly pressing **ADV.SEGM** (25) and **ADV.HOUR** (26).
2. Press the **ERASE** pushbutton (28).
3. Verify proper erasing by checking that the **TIMER INFO LINE** displays: "MEM. 00".
4. Move back to the current time by repeatedly pressing **ADV.SEGM** (25) and **ADV.HOUR** (26).

4.3.2.4 MODIFYING A TIMER PROGRAM MEMORY LOCATION (SEGMENT)

1. Move to the time display to be modified by repeatedly pressing **ADV.SEGM** (25) and **ADV.HOUR** (26).
2. Set **CHANNEL** (3) and **SEL.SECTION** (8) to the desired new configuration.
3. Press **STORE TIMER** (27) until the desired loop memory is indicated in the TIL (or „=>“, if auto-printing is desired).
4. Verify proper programming by checking the TIL-display.

Move to the current time by repeatedly pressing **ADV.SEGM** (25) and **ADV.HOUR** (26).

Table 4-4: Illustration of Timer Program Memory Spaces.

For each Timer Program there are 24 hrs by 15 segments = 360 possible programmable events.

Time Display	Timer Program # 1			Timer Program # 2			Timer Program # 3		
	MEM.	F,T,M,B	CHANN.	MEM.	F,T,M,B	CHANN.	MEM.	F,T,M,B	CHANN.
00:0									
00:1									
00:2									
00:3									
00:4									
00:5									
00:6									
00:7	01	T	1						
00:8									
00:9									
00:A									
00:B									
00:C									
00:D									
00:E	02	T	1						
01:0									
01:1									
01:2									
01:3									
01:4									
01:5									
01:6									
01:7	03	T	1						
01:8									
01:9									
01:A									
01:B									
01:C									
01:D									
01:E	04	T	1						

... and so on for hours 02 through 22, ..until:

Time Display	Timer Program # 1			Timer Program # 2			Timer Program # 3		
	MEM.	F,T,M,B	CHANN.	MEM.	F,T,M,B	CHANN.	MEM.	F,T,M,B	CHANN.
23:0									
23:1									
23:2									
23:3									
23:4									
23:5									
23:6									
23:7	11	T	1						
23:8									
23:9									
23:A									
23:B									
23:C									
23:D									
23:E	12	T	1						

Above entries are examples (Passive time segments will indicate MEM.00 in the Timer Info Line).

4.3.3 AUTOMATIC RECEPTION

After configuring the system to automatically receive transmissions, reception is accomplished by the following procedure:

1. Set **TIMER** (24) to the **ON** position.
2. Set **SPLIT/SN/N-S** (12) to **SN** (middle position) when receiving METEOSAT; GOES uses N-S.

When automatically receiving GMS, the GMS channel must be selected at the **CHANNEL** switch (3), when receiving GOES or METEOSAT, the setting of the **CHANNEL** switch does not matter, because the timer program will automatically select the channel and mode. If your program includes automatic printing, make sure that **DISPL.SELECT** (5) is set to **Aux** or **Bu**.

ADDITIONAL INFORMATION ABOUT TIMER OPERATION:

When automatic capture is activated, the system continuously checks the „MEM.xx“-entry in the program memory (TIL). As long as it is „00“, nothing happens and the system can be operated manually. As soon as a number different from „00“ is detected, the system changes its configuration according to the other two entries in the program memory (image section and receiver channel) and captures the image in Bu or Aux memory. In the moment when reception **stops**, the image will be **automatically transferred** into the programmed loop memory indicated in the **TIL**.

Keep in mind, that the important moment is, when image capture in Bu (or Aux) stops. Due to deviations of the clock crystal frequency, it can happen that programmed time segments open too early, so that capture-stop of the previous image releases image transfer. Correct (synchronize) the clock if such errors happens (see paragraph 4.3.2.2).

4.3.4 AUTOMATIC PRINTING

If a printer is used with the system, it is recommend to use the auto-print function to store individual images and reserve the loop memories for storing loop sequences. The auto-print function works similar to the auto-transfer-function described above with the difference that the image is transferred from **MONITOR 1** to the printer and printed.

For preparing automatic printing of images on an optional printer, follow the procedure in paragraph 4.3.2.1. In step **9**, the „=>“-symbol must be moved into the Timer Info Line (TIL) instead of a loop memory number. Auto-printing can be programmed at any time in between other programmed events (loop transfers). Auto-printing is activated when the **TIMER** switch (24) is set to **ON** (same as auto-capture described in paragraph 4.3.3).

Two cable connections from the **WSD-700** to the printer have to be made:

1. From **PRINT/REC** (5-pin DIN jack) to the **REMOTE** jack on the printer.
2. From **ALL MEMs** video output to **Video Input** on the printer. (If a Monitor is connected to the **ALL MEMs** jack, use the video-out jack on the monitor).

4.3.5 *AUTOMATIC RECORDING OF NOAA-IMAGERY*

4.3.5.1 *GENERAL*

The **WSD-700** does not allow direct unattended capture of polar-orbiting satellite images into the internal memories. However, it can be configured to allow automatic recording of NOAA-images on an external (optional) DAT-recorder. These recorded images can be at a later time played-back into the **WSD-700** for display and/or printing.

The **WSD-700** has to be internally configured for Auto-NOAA-Recording by setting the DIP-switch located behind the front panel switches (13) and (15) to the ON position. This disables the Auto-Print function and enables the Auto-NOAA function. (Disconnect the **WSD-700** from the mains power and remove the top cover to reach the switch).

The recoder must be connected via the special DAT-recorder-cable with the **PRINT/REC.** rear panel jack on the **WSD-700**.

4.3.5.2 *PROGRAMMING NOAA-RECORDINGS*

Take the following steps to programm the **WSD-700** for automatic recording of NOAA-images:

1. Find out the time period in which the satellite you intend to record is in the line of sight to your location. An excellent tool for this is the „SatCom“ software package running on a PC or notebook computer (available from WRAASE).
2. Set **CHANNEL** (3) to the NOAA-frequency channel for the satellite to be recorded (1 or 2).
3. Set **ADV.SEGM.** and **ADV.HOUR.** to the time segment in which the first satellite contact is scheduled.
4. Press **STORE TIMER** (27) repeatedly until * MEM. => * is indicated in the TIL.
5. Press **ADV.SEGM.** (25) once to increment segment display.
6. Repeat step 4 and 5 until you have reached the time-segment in which the contact to the satellite will be lost.
7. Move segments and hours so that the current time is displayed.
8. To start automatic unattended capture and recording, set **TIMER** (24) to the **ON** position.

Auto-NOAA-recording can be programmed at any time in between other programmed events (loop transfers) and recording of NOAA-imagery will take place during normal unattended operation, i.e. the system will automatically switch between NOAA- and geostationary mode and record NOAA-images as well as METEOSAT loops without operator intervention.

4.3.5.3 PLAYING NOAA-IMAGES BACK FROM DAT-RECORDER

For playing-back recorded images, set **CHANNEL** (3) to position „6“ (the unassigned position next to 5) and follow the procedure for manual capture of polar orbiter satellites described in chapter 4.1.2 , steps 1 through 6 , 9 and 13 through 16.

4.4 SPECIAL FUNCTIONS

4.4.1 SIGNAL LEVEL ADJUSTMENT

For getting best and equal picture quality over long periods, it is important to monitor the input signal levels. A built-in level indicator circuit provides level indication in the video monitor. The circuit is activated by moving **DISPL. SELECT** (5) to **LEVEL**. This step allows the monitor to perform the function of an oscilloscope with a vertical time scale and a horizontal amplitude scale.

Note, that the display will be reversed by the North-South-Reverse-Switch (12). The screwdriver-operated rear panel control **BRIG** (30) adjusts the brightness level (DC-level), i.e., it shifts the display horizontally to the right or left.

Correct setting of these controls can best be checked during **Start** or **Stop** tone transmissions, because the display shares a sine wave at maximum amplitude. The sine wave should just fill the display field without having flat corners.

Note: When LEVEL INDICATION is selected, normal operation of the system is continued, i.e. the receiving signal is written into BUFFER memory and automatic TRANSFER is executed as programmed.

IMPORTANT: Correct setting of the BRIGHTNESS level is necessary for proper **START** and **PHASING** of the METEOSAT images.

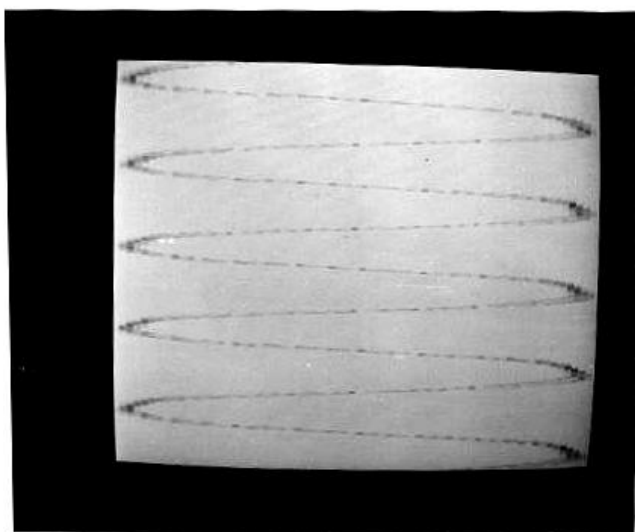


Figure 4-1: Level-Indicator-Display during STARTTONE with brightness correctly set.

4.4.2 ZOOMING LOOP IMAGES

A fixed zoom-factor of 200% can be applied to all loop images for detailed viewing. The zoom display is instantaneous and the zoom window is quickly movable over the full image area. Even during animated loop display, it is possible to activate the zoom and to move the window to any area of interest for detailed viewing of the film loop. It is at any time possible to switch back to the full, unzoomed image.

The zoom will not modify or damage any stored images, it can be used any time without affecting manual or automatic capture of images. Automatic timer-controlled transfer will always store the full image, independent of the setting of the **ZOOM** switch (20).

Two modes are available at the **ZOOM** switch (20):

1. **ON** (middle position): Regular zoom (horizontal + vertical magnification).
2. **VERT.:** Only vertical magnification. The image will be stretched in the vertical direction, which is especially useful for distortion correction in areas near the poles.
3. **OFF:** Zoom switched off.

Operate the switch **SHIFT: VERT - HOR.** (21) to move the zoom window vertically and horizontally.

If desired, an image can be further magnified by transferring the zoom window to the buffer and back to the loop memory. Since the original image resolution of 512 x 512 elements is not changed, such further blow-up will normally not provide much additional information for the viewer. Nevertheless, multiple blow-up to pixel size is possible. Use the following procedure:

1. Set **VIDEO** (29) on the rear panel to **60 Hz**.
2. Set **SEL. SECTION** (8) to **STP.** to stop any ongoing image reception in buffer.
3. Set **DISPL. SELECT** (5) to **LOOP** and display the desired image (See paragraph 4.2.4).
4. Set **ZOOM** (20) to **ON** and use **SHIFT** (21) to move to the desired image area.
5. Press **RETRF** (10).
6. Press **TRANSF.** (9).
7. Repeat 5 and 6, if further blow-up is desired.

Note: The retransfer operation (step 5) copies the zoom-window out of the original full image into buffer, transferring it back to the same loop memory (step 6) will destroy the original image.

4.4.3 JOINING LOOP IMAGES

4.4.3.1 GENERAL

PRINCIPLE of OPERATION

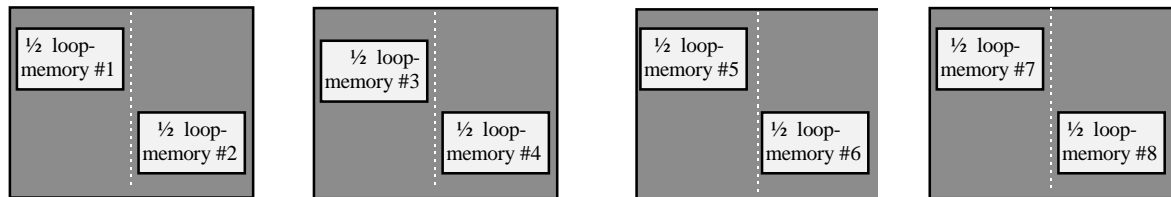
For dissemination through the METEOSAT, the raw image of the full earth disk is divided into nine square, non-overlapping segments. In areas close to the borders of these segments weather forecasters will need to view and analyse the neighbour image also. The **WSD-700** allows to horizontally join METEOSAT formats so that their border appears in the center of the screen, which can significantly increase the usability of METEOSAT images in certain areas.

Joint images can be automatically captured and can run as an animated loop.

The **WSD-700** even allows to automatically capture several different loops simultaneously, one with joining and one or more others without. (Display of different loops can alternate in 30 second intervals on the monitor without operator intervention; for details see paragraph 4.4.5).

For display of joint images, loop memories 1 through 8, or 1 through 12 are grouped in pairs. The image on the left has to be stored in an odd loop memory number and the image to be attached to the right must be in the next higher even loop memory number.

The following combinations are possible, if a maximum of 8 memories is selected:



The right half of the image in loop memory 1 is displayed in the left half of the screen, attached to the left half of the image in memory 2, the same with memory 3 and 4, 5 and 6, 7 and 8.

For automatic capture of animated loops with joint images, the timer has to be programmed according to that scheme: Images for the left side of the screen in odd memories, images for the right side in the even memories.

Images are always stored in full, joining only uses a different way to display images stored in neighbour memories. Therefore it is any time possible to display the images separately in original size as individual images or as separate film loops. Refer to paragraph 4.2.3. for how to create loop display arrays.

4.4.3.2 JOINING IMAGES (MANUAL MODE)

For manually creating a joint image display follow these procedures:

1. Decide which pair of loop memories are to be used for the joint image display . Possible choices are: (1,2), (3,4), (5,6), (7,8), (9,10) or (11,12).
2. If (9,10) or (11,12) were chosen, set JOIN8-JOIN12 (22) to JOIN12, else to JOIN8.
3. Follow the instructions in paragraph 4.1.1 to manually receive the first image. If it is the east section, transfer it to the even loop memory-number, if it is the west section to the odd.
4. Manually receive the second image. If it is the east section, transfer it to the even loop memory, if it is the west section to odd.

A joint-image display can be created from images already being stored in loop memories. The procedure is similar to the above with the difference that the images are not received but moved from loop into buffer using the RETRF button (10) before they are transferred into the dedicated odd or even memory. Note that joining must be activated at switch 22 (up or down

position) when the east image-section is transferred into the even memory, otherwise a thick disturbing vertical line will separate the two images.

4.4.3.3 IMAGE JOINING, AUTOMATIC MODE

For successfully using the joining feature for automatically captured loops, careful planning is recommended.

Eight or twelve loop memories can be reserved for automatic capture of joint images (selectable at switch 22). This will allow a loop of four or six joint formats, because a joint image always consumes two memories. The other eight (or four respectively) memories may be used for one or more regular loops or for storing single images.

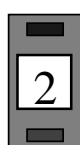
Prepare a program list for capture of joint images, use the METEOSAT schedule for selection. If desired, add a program for the other loop memories to your list.

1. Follow the procedure described in paragraph 4.3.2.1 to enter your program.
2. Set **JOIN8-JOIN12** (22) to **JOIN8** or **JOIN12**, depending whether you use eight or twelve memories.
3. Set **SPLIT/SN/N-S** (12) to **SN** (middle position)
4. Set **TIMER** (24) to **ON** to start automatic capture.
5. Follow the procedure in paragraph 4.2.3 to program one or more display sequences suitable for your capture-program.

4.4.3.4 EXAMPLE

Capture METEOSAT IR-formats D1 + D2 for joint display (24hrs) every 1 ½ hour in memories 1 through 8. Capture METEOSAT - VIS-format C03 in memories 09 through 16. The timer-program is shown in *Table 4-5* on the following page.

For display of these two loops, the following loop composition arrays are proposed:



LOOP COMPOSITION DATA BLOCK (LCDB)

POS:	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16
MEM:	01	02	03	04	05	06	07	08	=>							

Displays the joint D1+D2 images as an animated loop.

LP.SEL.(13)



LOOP COMPOSITION DATA BLOCK (LCDB)

POS:	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16
MEM:	09	10	11	12	13	14	15	16	=>							

Displays the C03-images as an animated loop.

If **ALTERN.LOOP** (14) is set to the up position and **LP.SEL.** (13) to **2** or **3**, both loops will be displayed alternately without operator intervention.

Additional useful arrays could be prepared, which show the original full D1 and D2:
MEM: 01, 03, 05, 07, => and MEM: 02, 04, 06, 08 =>.

Table 4.5: Example timer-program. Captures joint loop METEOSAT-IR D1+D2 and VIS-loop C03.

D1-FORMATS into odd loop memories

D2-FORMATS into even loop memories

CO3-FORMATS (VIS) every ½ hour

Time Display	Timer Program . No.		
	MEM	F,T,M,B	CH.
01:8	1	T	1
03:0	3	T	1
04:8	5	T	1
06:2	7	T	1
07:A	1	T	1
09:2	3	T	1
10:A	5	T	1
12:2	7	T	1
13:A	1	T	1
15:2	3	T	1
16:A	5	T	1
18:0	7	T	1
19:8	1	T	1
21:0	3	T	1
22:8	5	T	1
00:0	7	T	1
01:7	2	T	1
02:E	4	T	1
04:7	6	T	1
05:E	8	T	1
07:7	2	T	1
08:E	4	T	1
10:7	6	T	1
11:E	8	T	1
13:7	2	T	1
14:E	4	T	1
16:7	6	T	1
17:E	8	T	1
19:7	2	T	1
20:E	4	T	1
22:7	6	T	1
23:E	8	T	1
07:9	9	M	1
08:1	10	M	1
08:9	11	M	1
09:1	12	M	1
09:9	13	M	1
10:1	14	M	1
10:9	15	M	1
11:1	16	M	1
11:9	9	M	1
12:1	10	M	1
12:9	11	M	1
13:1	12	M	1
13:9	13	M	1
14:1	14	M	1
14:9	15	M	1
15:1	16	M	1

4.4.4 SPLIT SCREEN MODE

The **WSD-700** provides a special „Split-Screen“ mode. This mode was especially designed for users in central Europe, where the METEOSAT formats „D2“ (infrared) and „C03“ (visible) are of major interest. These images can provide most high-value information if compared side by side in a running film loop. This is achieved in the split screen mode, which can be activated at switch (12) in position **SPLIT**.

Although especially designed for the C03/D2-formats, the split-screen mode can be used for comparison of other images as well.

Note that switch (12) has three positions and controls two completely different functions, the *rotate image function* (north-south / south-north) and the *split-screen mode*.

The split screen display is similar to the joint-image display described in paragraph 4.4.3.1, with the difference that the left half of the image in the odd memory is attached to the right half of the image in the next even memory. Another difference is, that the split screen is always active for all 16 memories.

If **ENH.** (15) is set to position „2“, different enhancements will be active on both sides of the screen to compensate for the difference in contrast of IR and VIS.

To automatically capture the loops for the split-screen mode, follow these procedures:

1. Follow the procedure described in paragraph 4.3.2.1 to enter a program that assigns the **C03**-images to the **odd** memories (1,3,5,...15, 1, 3 ..) and the **D2**-images to the **even** memories (2, 4, 6,...16, 2, 4,...).
2. Set **SPLIT/ SN/N-S** (12) to **SPLIT** (up).
3. Set **TIMER** (24) to **ON**.
4. Set **ENH.** (15) to **2**.

Animated loop display can be achieved with the standard array described in paragraph 4.2.4.

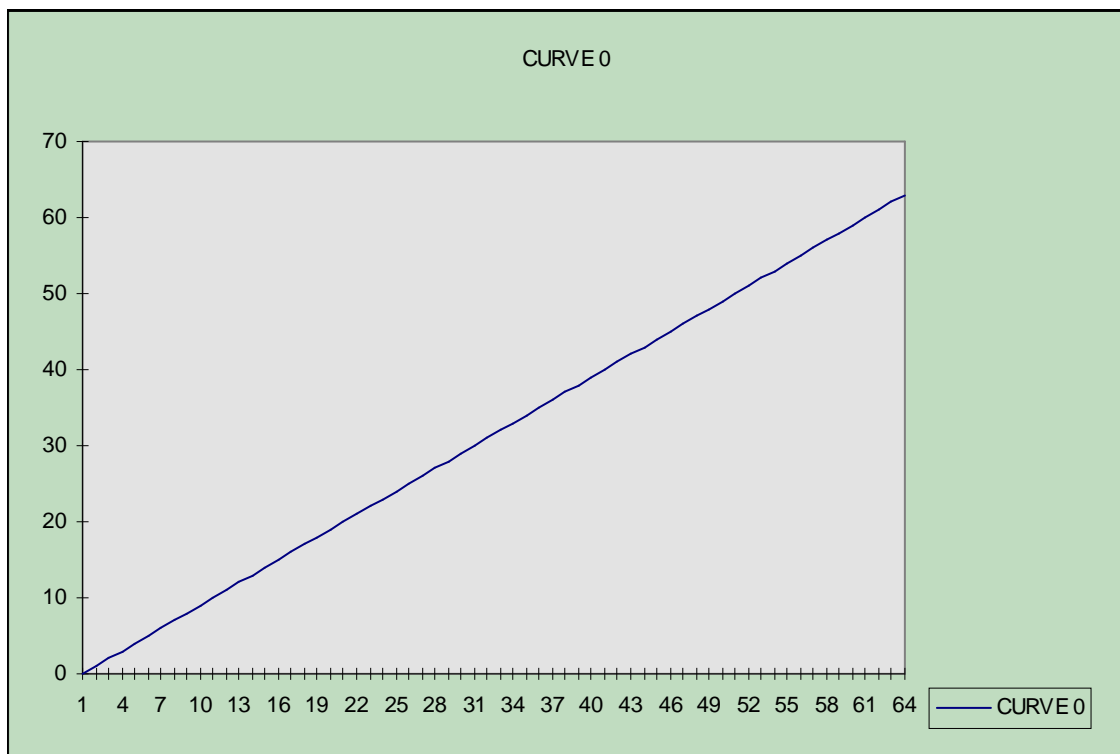
4.4.5 ALTERNATING LOOPS

Sometimes it is desirable, that the display monitor will alternate automatically between different loops, especially during unattended operation, e.g. for distribution of the video signal in a cable tv net.

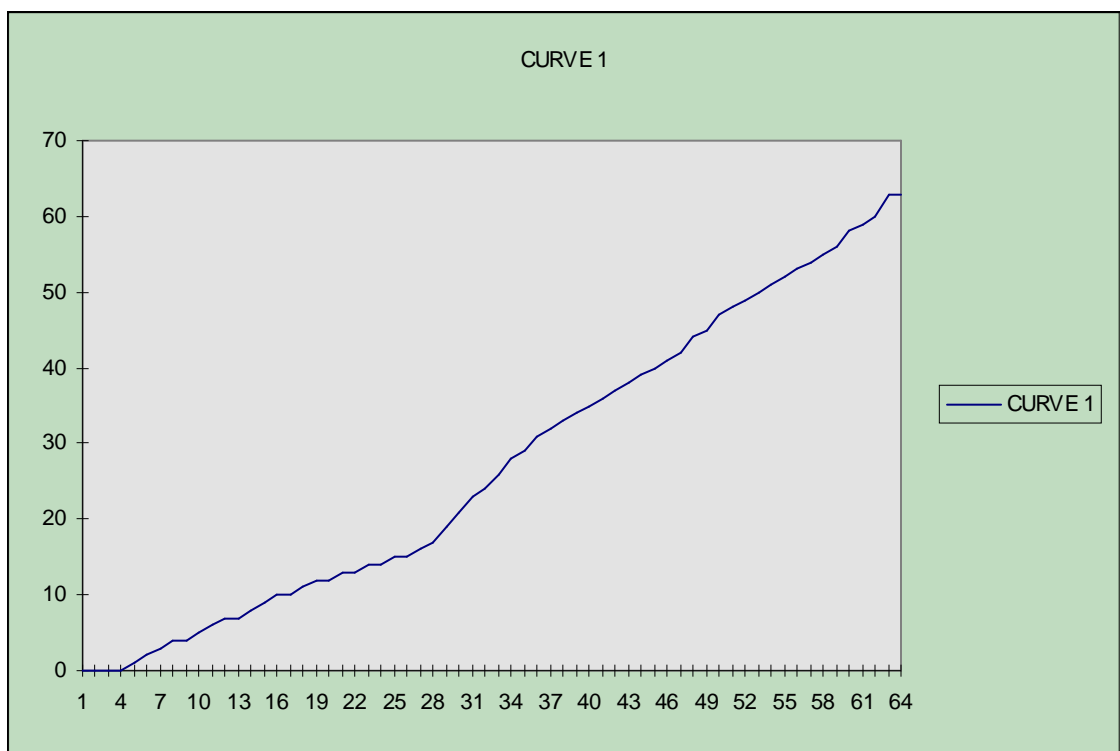
Set the **ALTERN. LOOP** switch (14) to the up position to activate loop alternation in fixed 30-second intervals.

See page **15** for further information.

WRAASE WSD-700 ENHANCEMENT CURVES

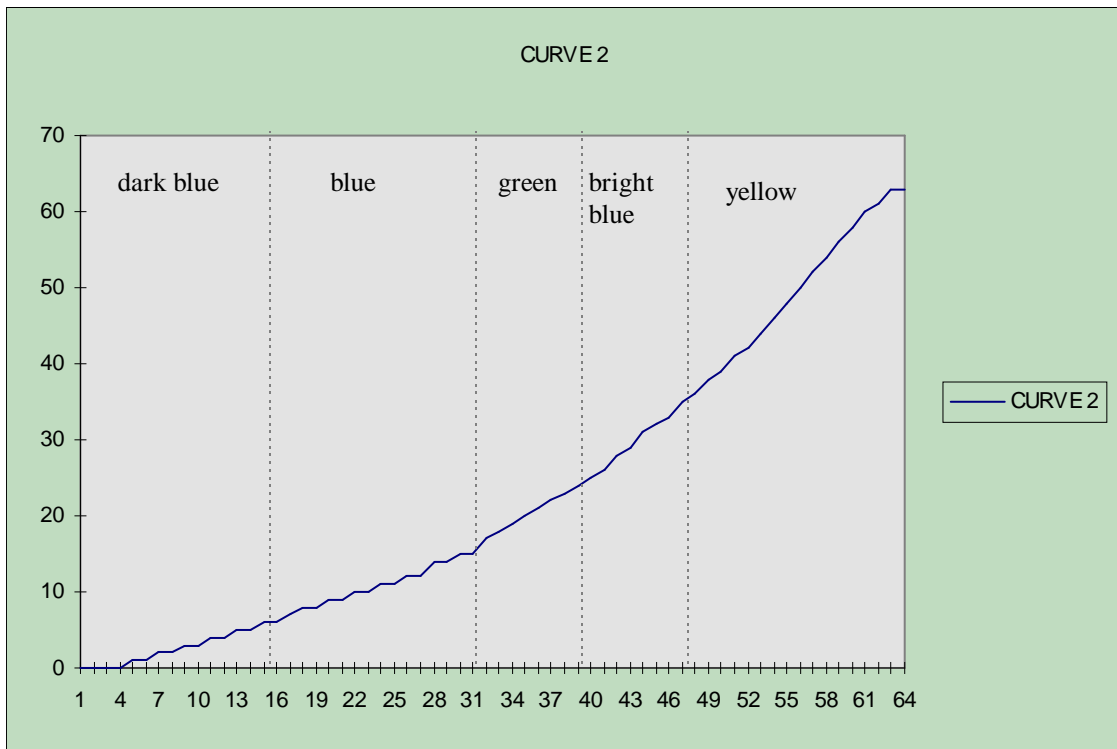


LINEAR GREY. No enhancement, no color



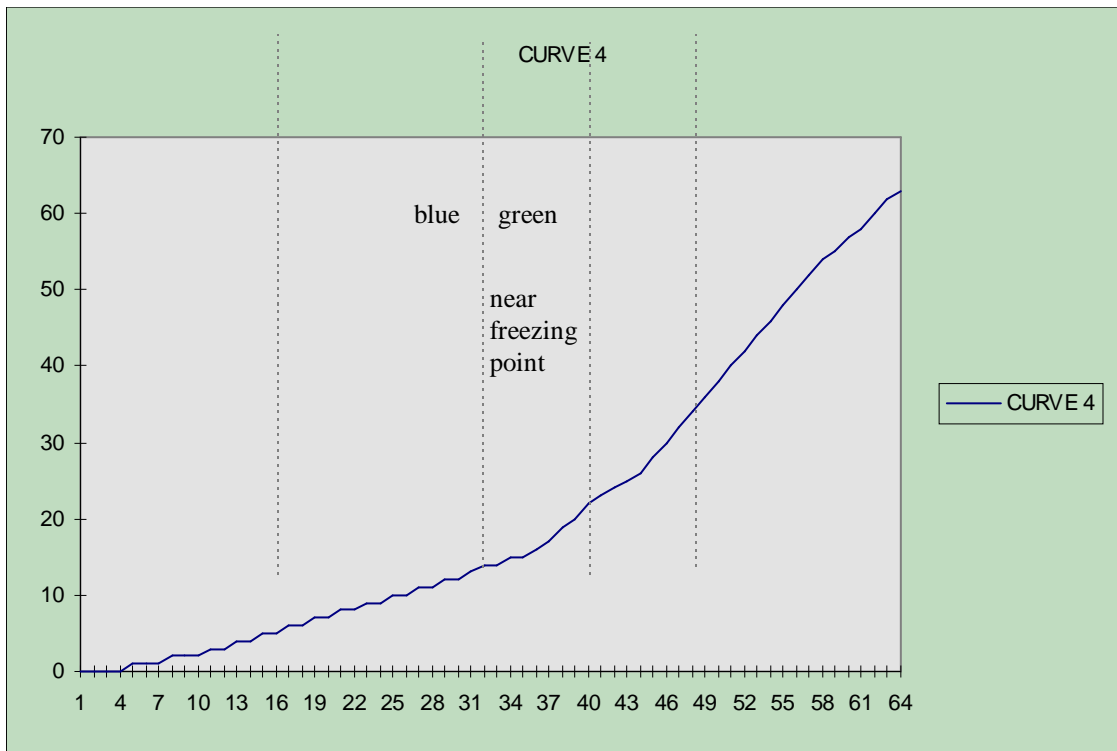
Increased contrast for temperatures under +10 C on METEOSAT.
Reduced contrast for temperatures above +10 C. No color.

EQU. CURVE 6 in WSD-690rx



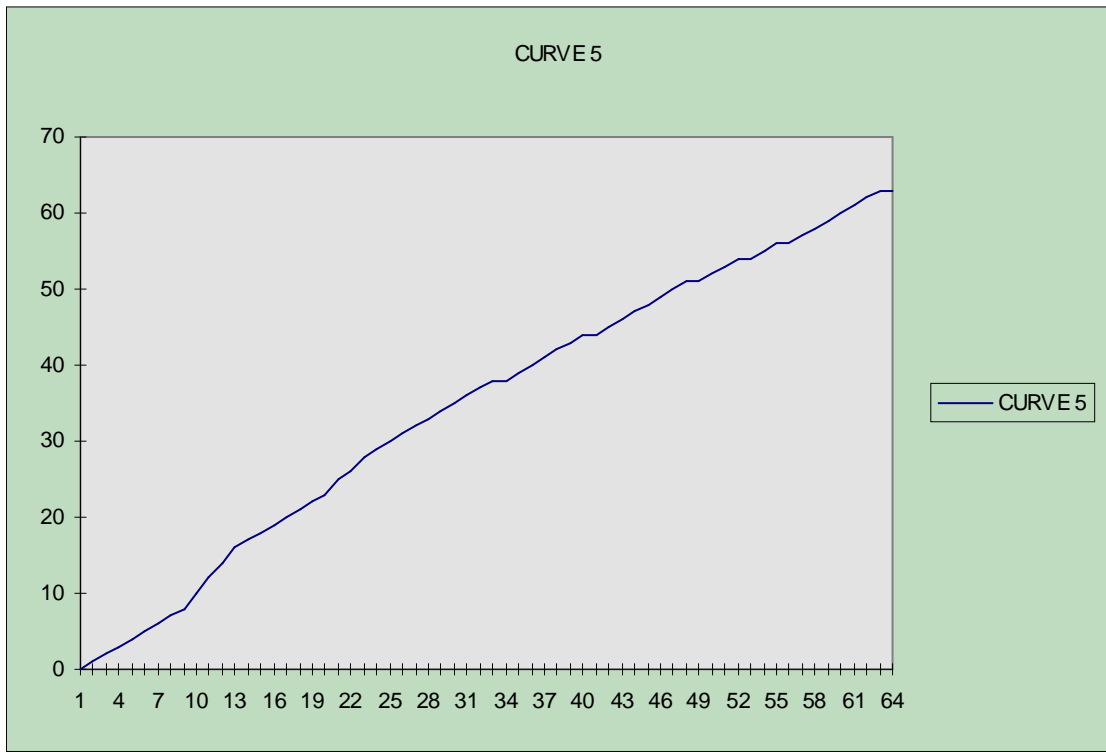
Color Enhancement for IR-images. Low contrast on top, above +10 C, increased contrast below +10C. Color changes from bright blue to green on appr. +5 C. High tops are yellow.

CURVE 3 equals curve 0 with color being added; good for VIS images with good illumination (gives near natural colors).

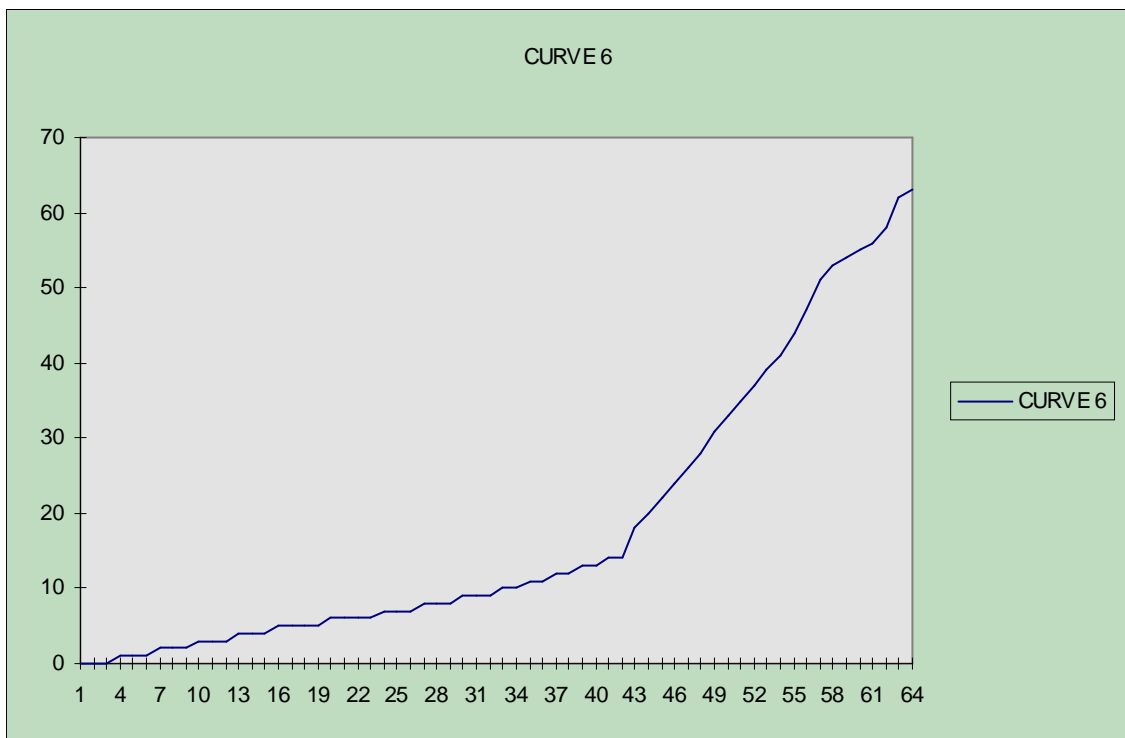


Similar to curve 2, but different color ranges. Temperatures near the freezing point show green color.

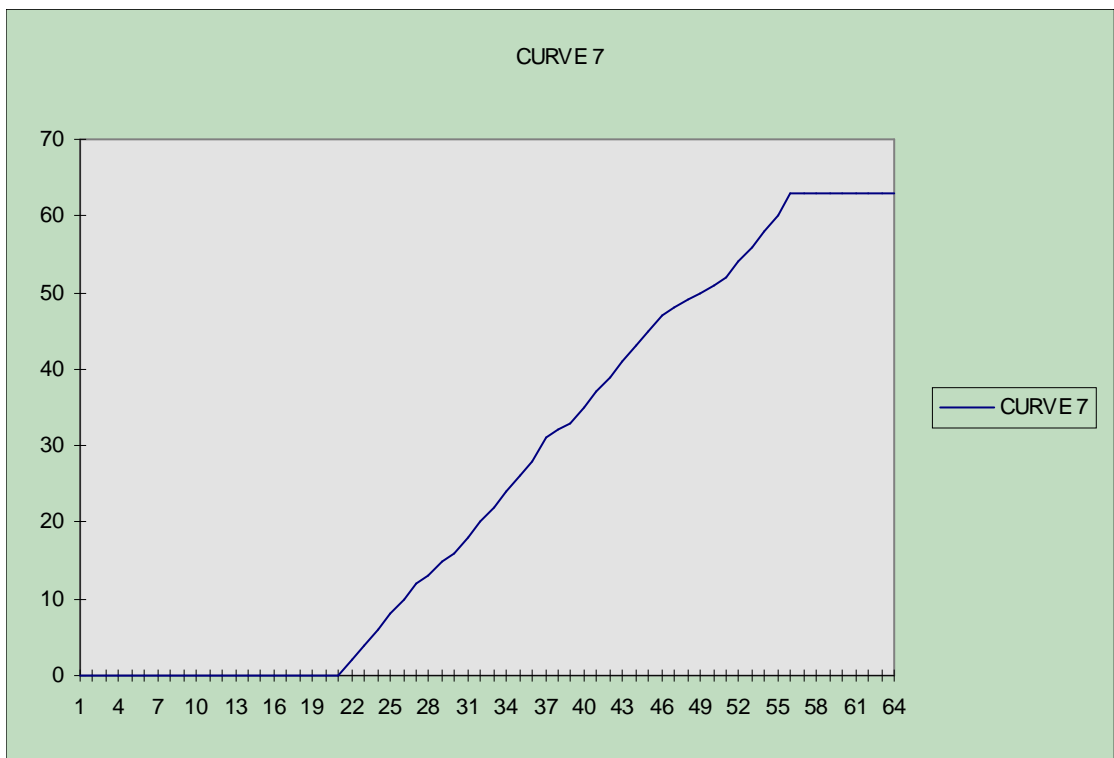
EQU. CURVE 14 in WSD-690rx



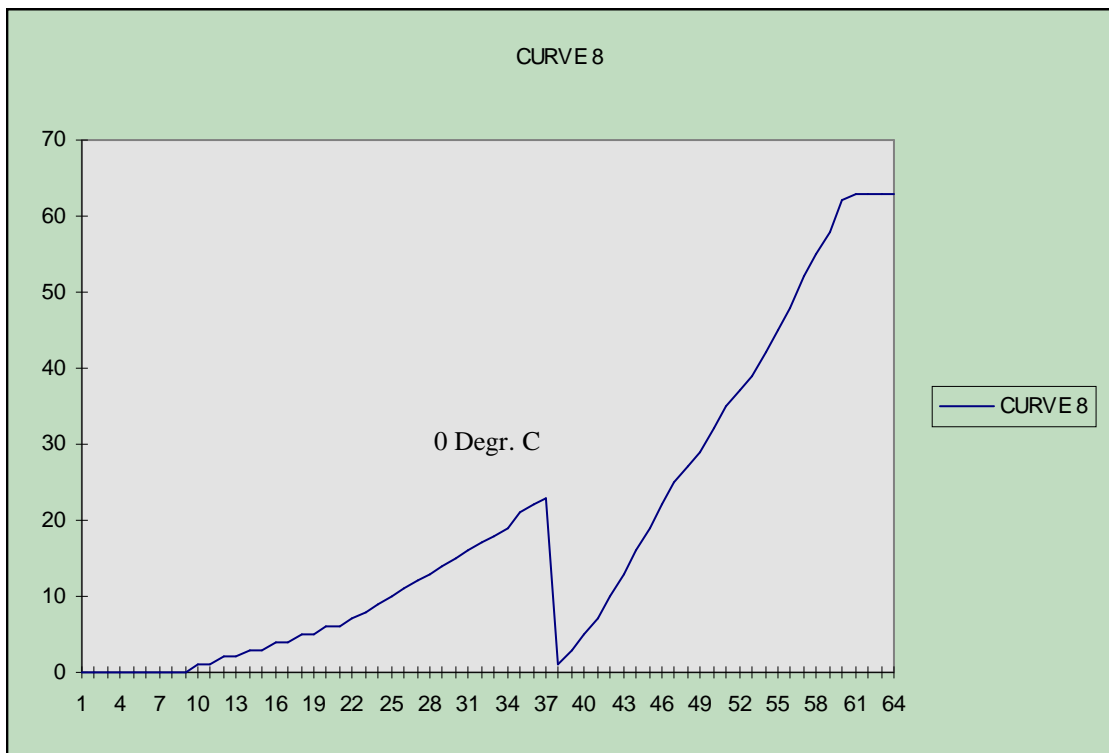
Increased contrast on VIS-images with low illumination (winter). Near natural colors.



IR-Curve: Higher clouds (below -20 C) are shown with increased contrast, includes color.



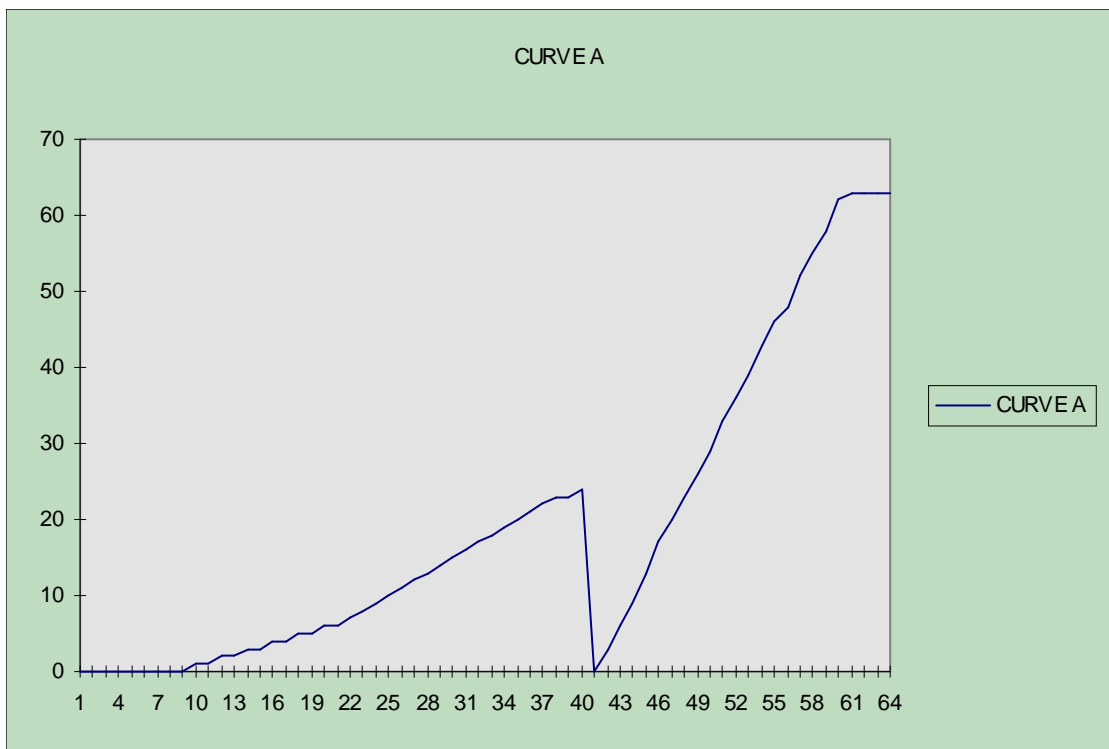
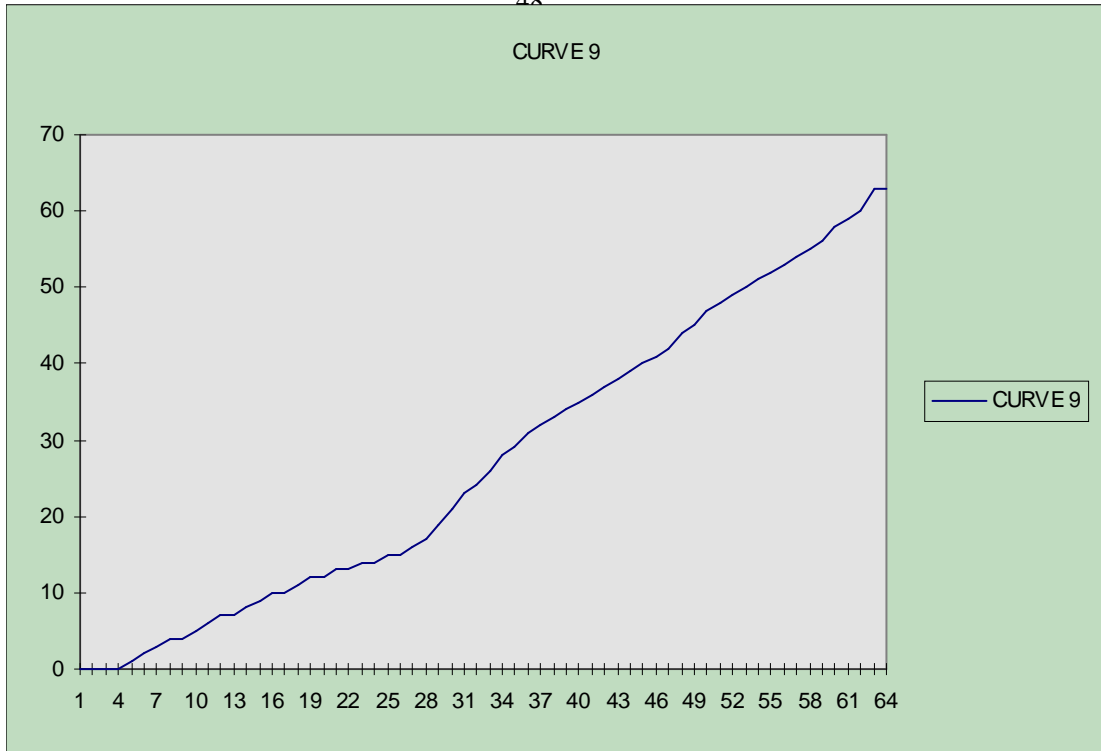
EQU. CURVE 7 IN WSD-690rx



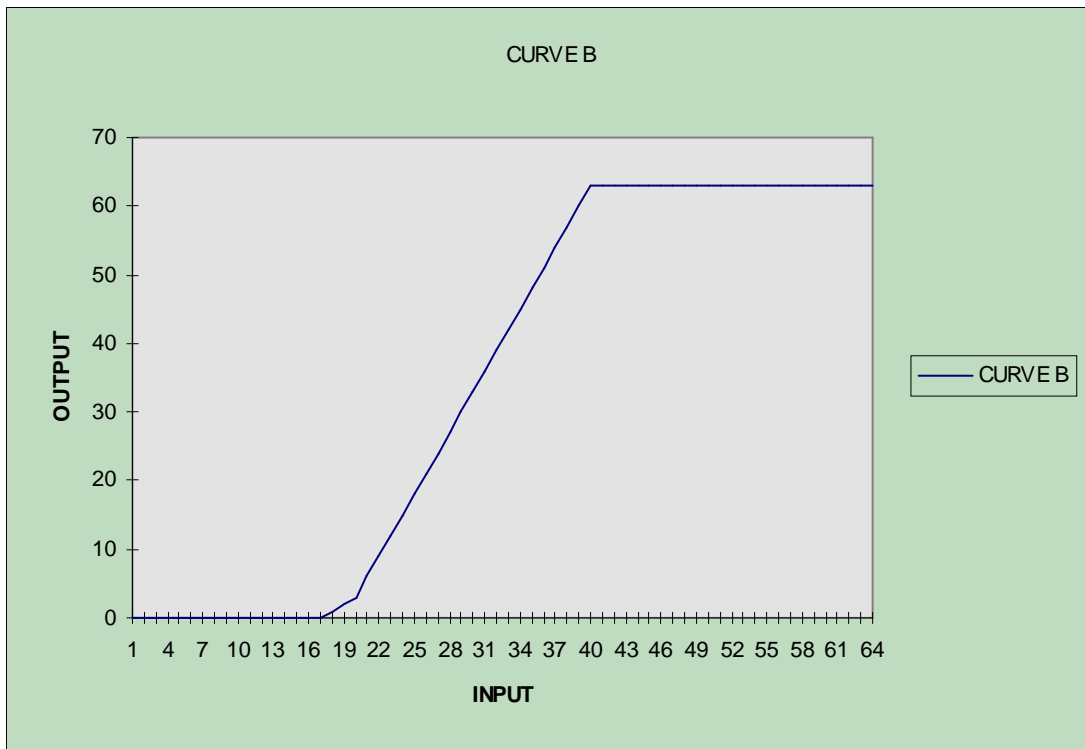
Temperatures above +30 C are excluded. Increased contrast in the most significant IR temperature ranges. Good contrast to distinguish high fog from surface temperatures.

Similar to CURVE 8 IN WSD-690rx

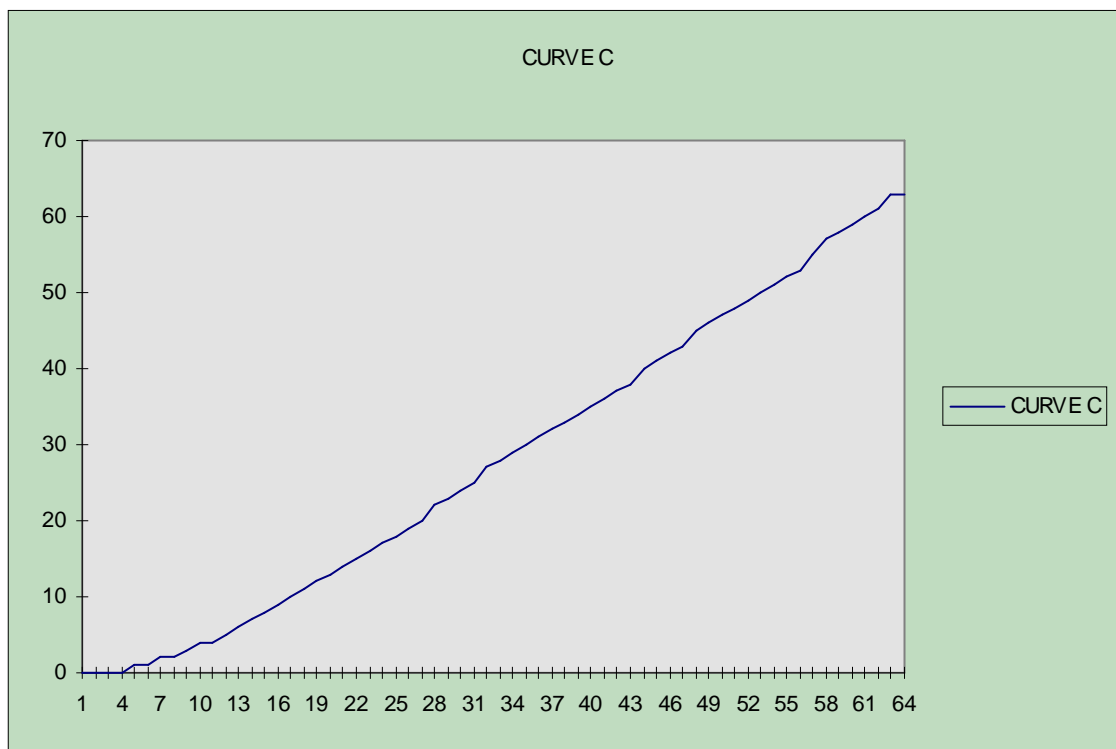
3D-like representation of cloud fronts, starting at approx. -5 C (black).

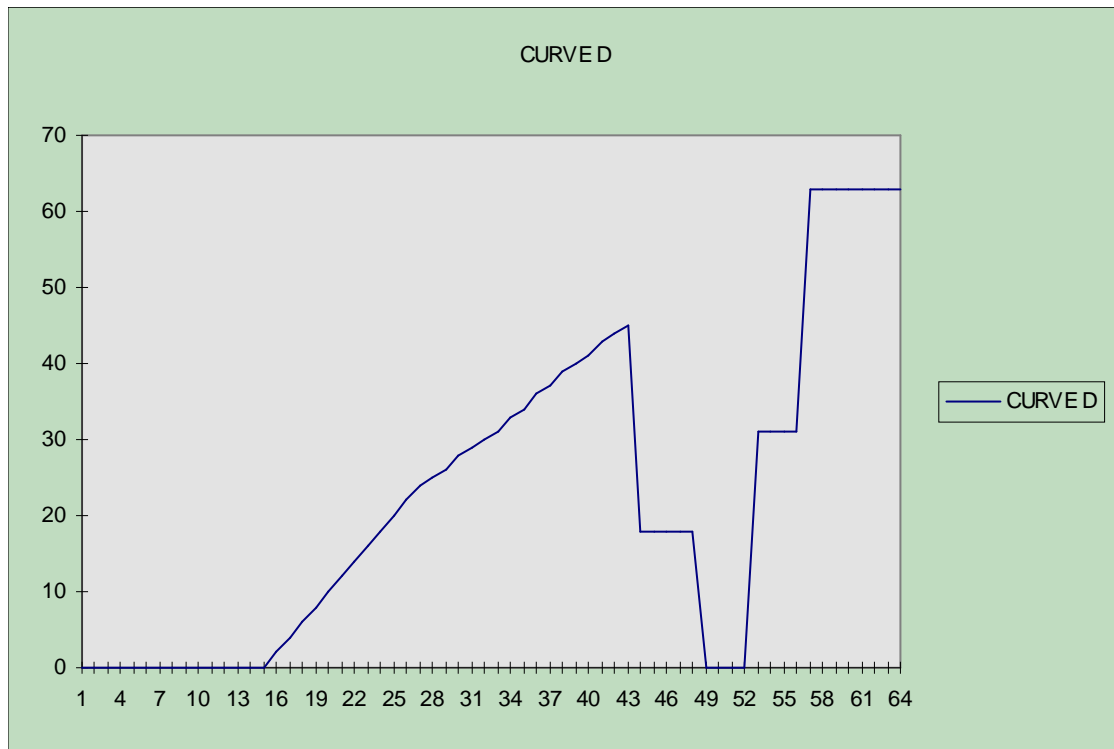


Equals curve 8, except that cloud representation starts at approx. -10 C.

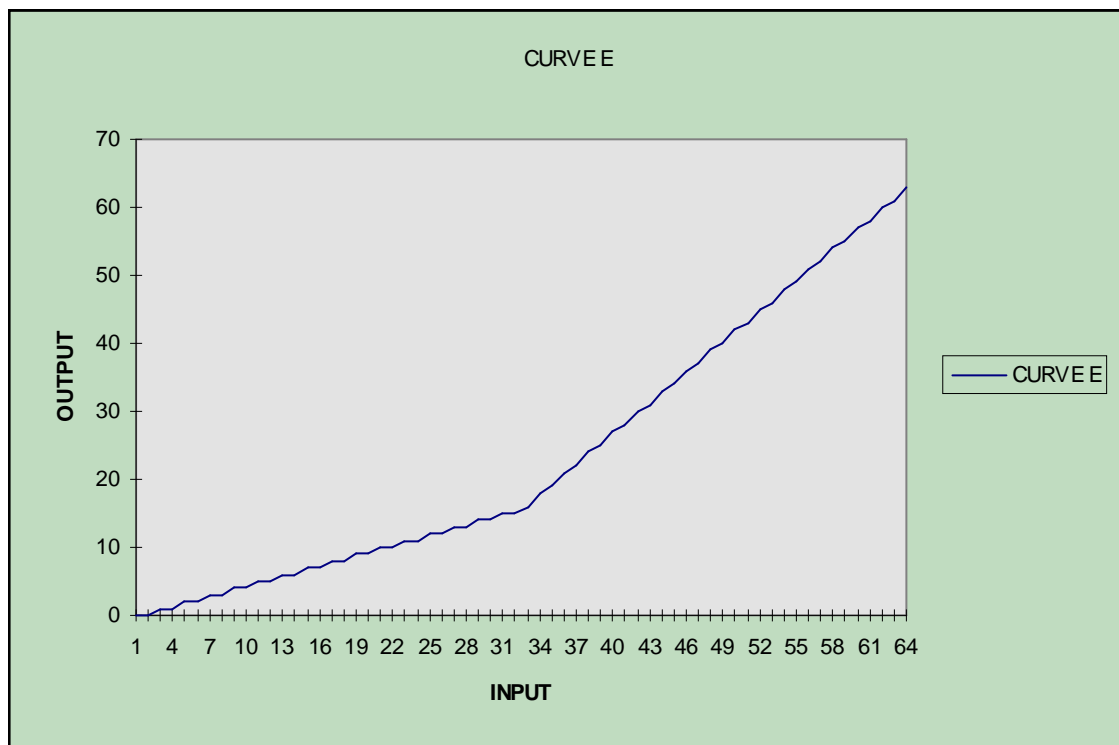


IR-CURVE: Range +30 ... -15 C; good to estimate surface temperatures and fog.

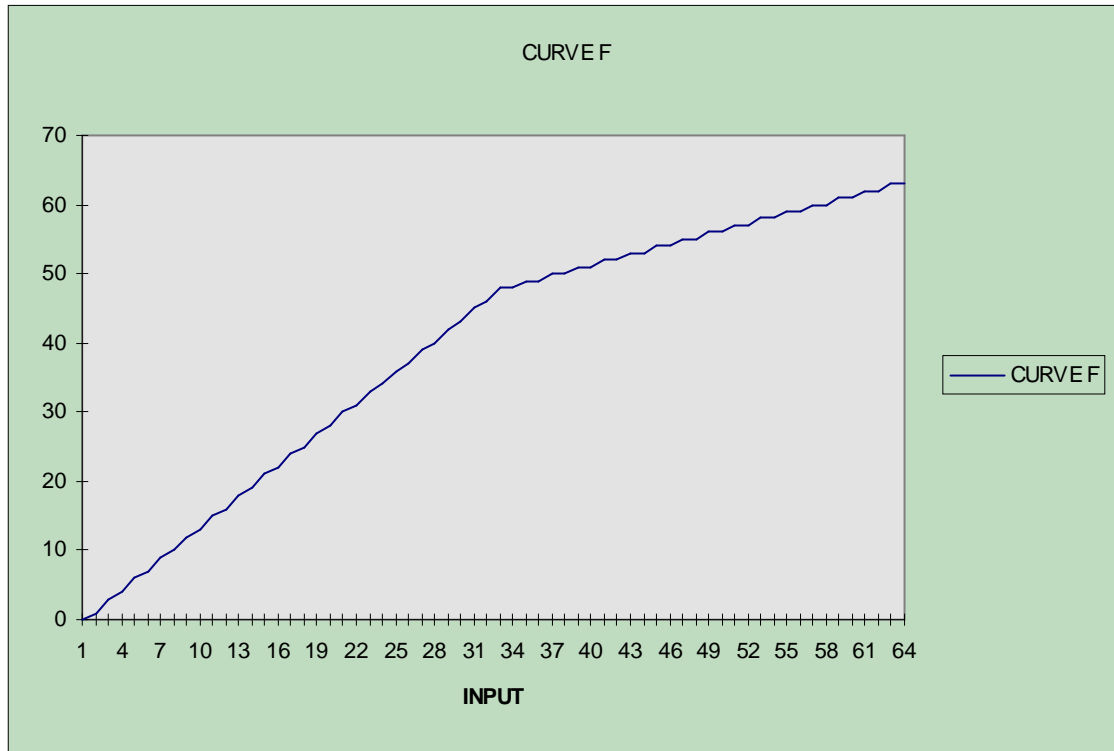




EQU. CURVE 13 IN WSD-690rx



EQU. CURVE 14 IN WSD-690rx



High contrast on VIS-images with very low light .

EQU. CURVE 15 IN WSD-690rx