FLIR Publication number: 557 344 version B

Offset (from block start, hex) Block start offset is +44h

+00h	float R;	Calibration constant R
+04h	float B;	Calibration constant B
+08h	float F;	Calibration constant F
+0Ch	float alpha1;	Attenuation for atmosphere without water vapour
+10h	float alpha2;	Attenuation for atmosphere without water vapour
+14h	float beta1;	Attenuation for water vapour
+18h	float beta2;	Attenuation for water vapour
+1Ch	float X;	Scaling factor for attenuation
+20h	float tmax;	Upper temp limit [K] when calibrated for current temp range
+24h	float tmin;	Lower temp limit [K] when calibrated for current temp range
+28h	short notation;	Presentation precision, HIGH=1 / LOW=0
+2Ah	char imageFrq;	Image frequence. 0 = unknown
+2Bh	char saturationLimit;	% of rawpixel max value to be considered as over saturated (= too hot for current temperature range). Values 0 – 100.Used by scanner for calculation of adjust par – ipixOverflow
+2Ch	char scanner_name[21];	Scanner type (name)
+41h	char scanner_artn[10];	Scanner article number, for instance "990104"
+4Bh	char scanner_sn[10];	Scanner serial number, for instance "656012"
+55h	char lens_name[11];	Name of lens type, for instance "FOV 20"
+60h	char lens_artn[10];	Lens article number, for instance "0"

10. Temperature calculation on IR images

To convert an image pixel value to a corresponding object temperature, one must perform some calculations using the data part of the image. The following formulas should be applied

1. Convert from image pixel value to a temperature compensated, linearized pixel value, here called ’absPixel’. See discussion in chapter Adjust parameters on page 41 how to do this.
2. Calculate some temporary results to use (parameters here are from image "Object parameters" and "Calibration parameters").

tatmC = atmTemp - 273.15

$$H2O = relHum \cdot e^{(1.5587 + 6.939 \cdot 10^{-2} \cdot tatmC - 2.7816 \cdot 10^{-4} \cdot tatmC^2 + 6.8455 \cdot 10^{-7} \cdot tatmC^3)}$$

$$\tau = X \cdot e^{\left[-\sqrt{objectDistance} \cdot (alpha1 + beta1 \cdot \sqrt{H2O})\right]} + (1 - X) \cdot e^{\left[-\sqrt{objectDistance} \cdot (alpha2 + beta2 \cdot \sqrt{H2O})\right]}$$

$$K1 = \frac{1}{emissivity \cdot \tau}$$

$$K2 = \left[\frac{1 - emissivity}{emissivity} \cdot \frac{R}{\left(e^{\frac{B}{ambTemp}} - F\right)} + \frac{1 - \tau}{emissivity \cdot \tau} \cdot \frac{R}{\left(e^{\frac{B}{ambTemp}} - F\right)}\right]$$

3. object signal (the corresponding signal level on the object) is calculated with the formula:

$$objectSignal(absPixel) = \frac{K1}{2} \cdot absPixel - K2$$

4. The corresponding temperature (in Kelvin) is given by the formula:

$$objectTemp(objectSignal) = \frac{B}{\ln\left(\frac{R}{objectSignal} + F\right)}$$