Inventory of the SMD boards as used in the IDS:

There are 2 different version of these boards used in the IDS and A&G box, and in the past also in the old Prime focus camera which was send to Greece years ago. There was a lot of confusion on what the exact differences where between the boards marked as: X.EC 014 and the modified boards marked as: X.EC 014/1, until I found the circuit diagram, on which the modifications can be seen clearly.

1. R35, R36, R37 and R38 were added on the solder side of the boards and didn't have designators in the original drawings, which has been corrected in the /1 version of the boards.
2. Board SMD2, which is used for the slit jaws and the slit shutter, has an extra Vero board mounted on the solder side of the board. This board contains a circuit to receive the signal from the SDSU CCD controller to operate the slit shutter and send status back to the CCD controller. On this version R35 to R37 also have been included on this extra Vero board. A drawing of this circuit is included in a seperate document. See fig 1. A spare board has also been build.
3. R34 and D6 have been added to provide a level clamping to 5 V, to correct the design fault to feed the output pulses of the 555 timer chip, powered with 12V directly into a TTL circuit, IC4. The choosen diode was 1N4004, which is also a fault, as this diode has a relatively high internal capacitor, producing high narrow pulses. This diode was changed for a 1N4148 signal diode. Also, R34 had already been used as the resistor R34 between pin 7 and 2 of the 555 timer. So its better to rename it to R39.
4. The time constant resistors R28 (RA1), R30 (RA), R31 (RA2) and R34 (RB) are not the same on each board. This much be due to the fact that optimum speed is different for the various mechanisms. When SPEED1 is selected R31 is connected in parallel with R30. When R31 is not fitted, as on some of the boards, the speed is just determined by R30. When SPEED2 is selected R27 is connected in parallel with R30.
5. TR1 2N3705 has been replaced on some boards by a IRF540 power mosfet or a BD243C power transistor. There is another version of this circuit used on SMD3, SMD4 and SMD5. On these last 3 boards IRF540 has been rewired, by cutting tracks and adding links, from a source follower to an open drain circuit.
6. SMD5 has IC1 (PROM) not fitted, as this boards only operates the observers port. This PROM is used to produce the sequence for the stepper motor power transistors.
7. SMD1 has a 74LS04 (hex inverters) added, of which 1 inverter is used . See fig 1 and 3
8. We have now a fair selection of spare SMD boards, which have been revised, repaired and tested. However, if you have to substitute a particular one, its always a good practice to compare the differences.

Overview of the differences between MMS Stepper motor drive boards, as used in the IDS:

	SMD1	SMD2	SMD3	SMD4	SMD5	
	DEKKER	SLIT JAWS/ SHUTTER	COLLI-MATOR	GRATING	OBS. PORT	FUNCTION
R28	100k	10k	6k8	15k	6k8	SPEED2
R30	220k	82k	220k	100k	82k	SPEED
R31	N.F.	47k	N.F.	N.F.	47k	SPEED1
R34	1k	2k2	2k2	1k	1k	SPEED
TR1	2N3705	IRF540	IRF540	IRF540	IRF540	Solenoid Driver
R1	2k7	2k7	12k	12k	12k	
Remarks	Extra inverter fitted. See: fig1 and 3	Extra Vero board fitted. See: fig2	Tr1 circuit modified See: fig4	Tr1 circuit modified See: fig4	Tr1 circuit modified See: fig4 No PROM fitted	

Tabel 1

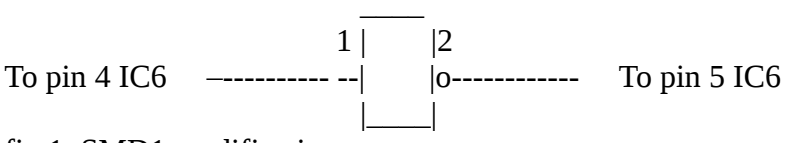

fig 1: SMD1 modification

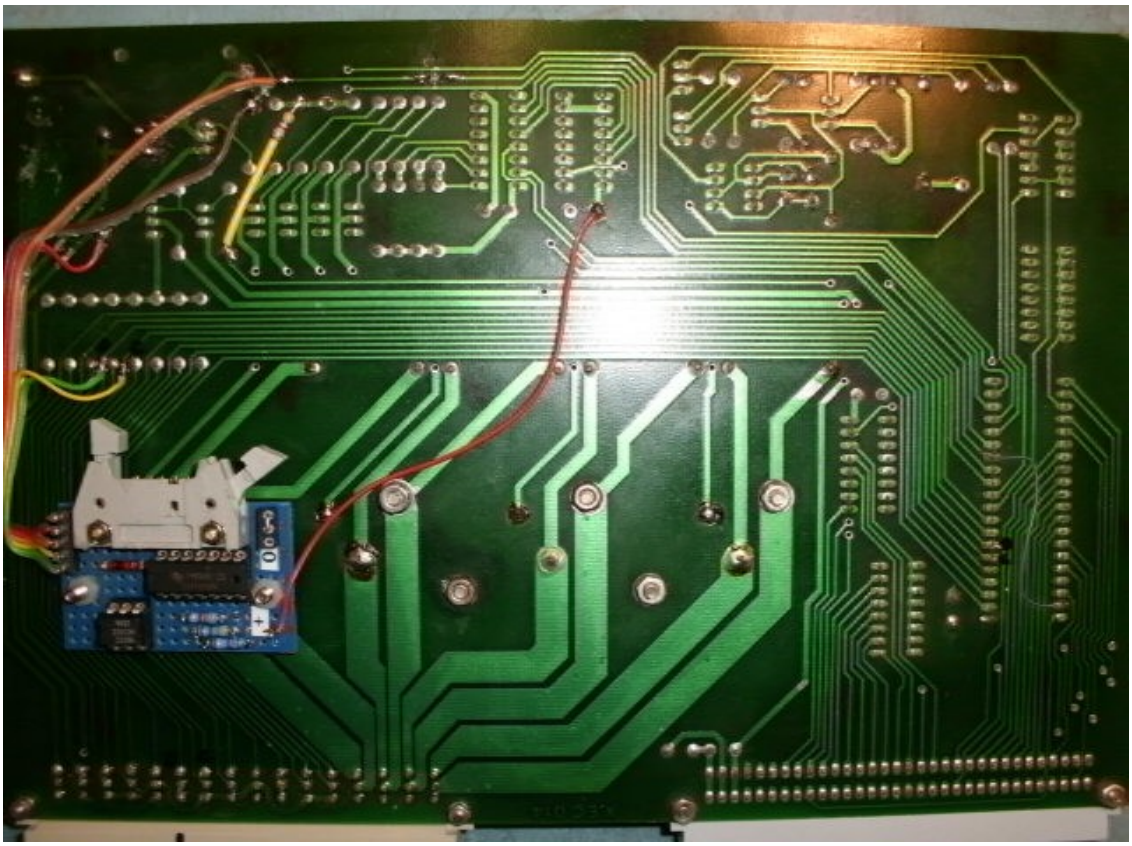

fig 2

SMD2 with the added shutter modification board.

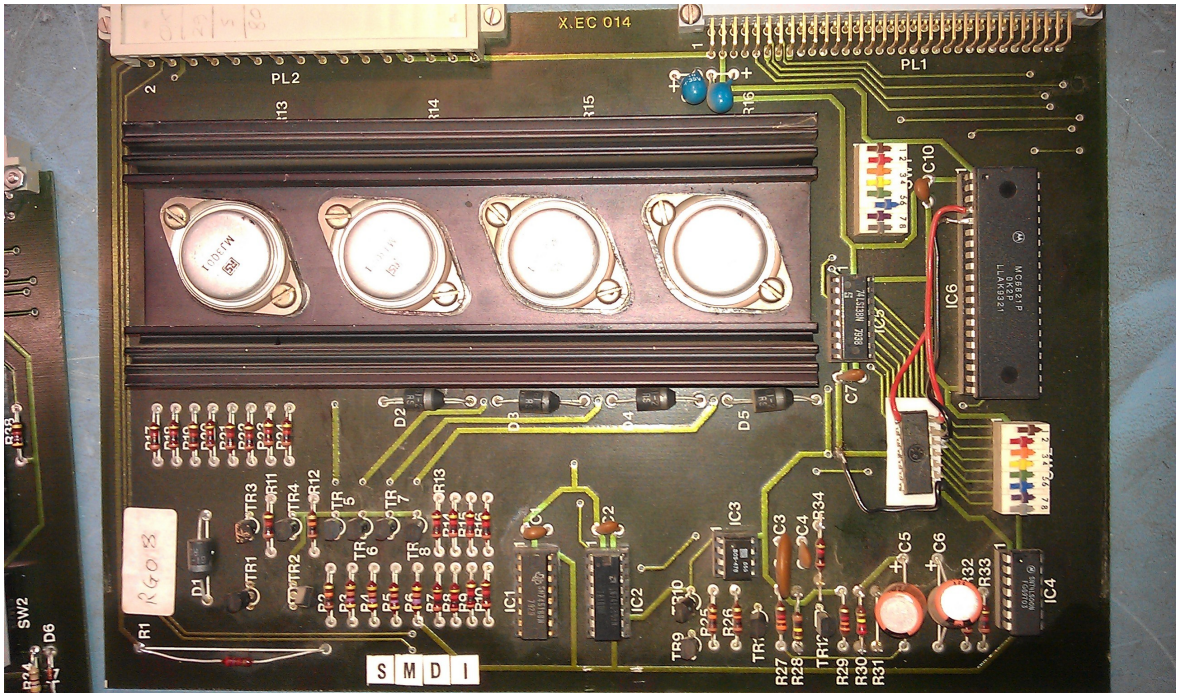

fig 3: SMD1 with the added 74LS04 inverter circuit

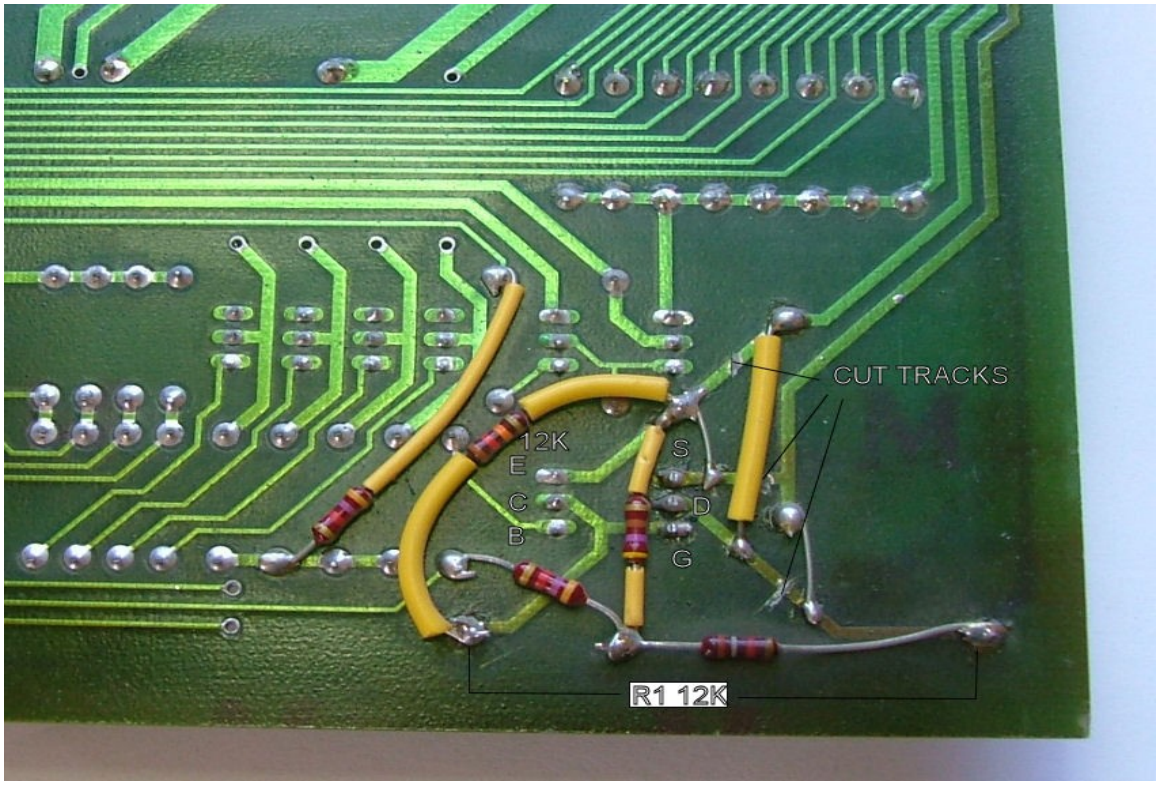

fig 4: SMD3,4,5 modification

Renee J. Pit, 1/10/2014
Modified: 7/04/2015
Modified: 12/01/2016, SMD2 (slit) speed resistors R28 and R34 increased to reduce max. speed.