

DIY Plans for Progressive Scan Input Card for Sony 12XX Series Projectors

Written by Heath Young

Introduction:

This input card came about due to the price and scarcity of Sony IFB-12/IFB-12A's, and my need for a component progressive scan input on my Sony 1252. Having had great trouble sourcing one in Australia, and in keeping with the price of my projector (err... I saved it from a council cleanup) I decided that there had to be an easier way.

I had read about the trick of using an IFB-12 as a component progressive scan input board by setting DIP switches 2 and 3 to on, and getting the sync from the video (Y) input. Looking at the schematics, it seemed too easy!

The dip switches (when ON) activate transistors that pull the inputs down to ground, with the notable exception of DIP 2, whose transistor pulls to ground via a 2.5V zener diode. In the circuit description, this is considered a logic level of M (OK... that's a new one for me). Dip Switches 2 and 3 therefore pull A17 (RGB/Video) to Medium, and C17 (Video/YC) and B16 (CODE1) Low. That's it for the mode selection.

Contrary to what some people think, the IFB12/A does NO colour space conversion at all. This means no tricky resistor selection, strange colours etc.

Thus came about the construction of the IFB-12HY!

Circuit Description:

The input board is activated by a Low on C19 - the +12V supply rail (A4 and C4) is switched by this and turns on the reed relays, indicator LED and powers the 7805 +5V regulator. There are two transistors that pull C17 and B16 to ground, and a 3.3V zener diode that produces an 'M' logic level (I would have used a LM336-2.5 but didn't have any on hand, and the zener fit better in the space).

The MAX497 requires a negative supply rail, which is produced by a square wave driven charge pump made up of an LM358 configured as an oscillator, which creates an AC square wave from the series 100uf capacitor, and the negative portion of this square wave is rectified and smoothed by the two diodes and capacitor.

Video input is buffered by a MAX497, a 6dB amp, and fed via reed relays as follows Pr - A21 & C21, Y - A25 & C25, Pb - A29 & C29.

If so desired, both the charge pump and MAX497 could be omitted, and video passed straight through the reed relays, but this is not recommended due to the possibility of spikes destroying input circuitry of the projector.

Sync is extracted from the Y (Luminance) channel by an LM1881 (which cannot handle tri-level sync) and V Sync is fed into A14 and C14 via a reed relay from pin 3, and Composite Sync is fed into A12 and C12 via a reed relay from pin 1.

PCB Description:

To make this board as easy to produce as possible, I have used a double sided board, with the component side as a ground plane, but to produce this board using single-sided techniques, the through-holes that are not vias or ground-connected are 'countersunk' so that the leads do not short to the ground plane.

Vias consist of PCB pins soldered between layers and then cut flush - you could use component leads, but I prefer PCB pins – much neater and if you drill the right sized hole they stay put while you solder them.

This allows simple techniques such as 'press-n-peel', along with using a spray paint to protect the ground plane - I used some expired positive photo-resist spray - but any rattle-can spray will work OK. Once you have etched the board, have a look at the PCB diagram, wherever there are vias or X's, do not 'countersink' to remove material. Spray both sides of the board with clear PCB lacquer - its solder through. Tinning solution would work just as well or better, but is difficult to source here in Aus.

You do need to use Dual Wipe (not machine pin) DIP sockets on the DIL relays and IC's or the shoulders on the pins will short to ground unless you remove a LOT of material. When you install all of the components, check that the pins are not shorted, visual inspection should suffice. For the DIL relays, remove the pins that are not needed from the DIP sockets by cutting off the unused pins flush with the body of the socket. Dont try and remove them whole as 14 sharp pins jammed in your thumb creates a lot of blood and PAIN (don't ask how I know this).

The only other difficult part to get is the 64 pin DIN 41612 connector. Try to get one that is populated with at least 2 rows (A & C), as the 3 row (A B C) seem difficult to get, and you will be removing a lot of unneeded pins anyway - there are only 2 'B' row pins that are needed, and bending one of the removed pins to fit is a snack.

The 3.3V zener diode is fitted to the underside of the board, between pins A17 and C17 of the DIN 41612 connector. As mentioned before, if you can lay your hands on a 3.0V or 2.5V – even better.

Finishing:

The PCB diagram also includes a drilling template to convert the 'blanking panel' of your projector into your input card - the BNC's are used to hold the panel in place against the PCB (rather than using aluminium angle or anything else nasty or difficult to find).

Your indicator LED can be any colour you desire, I suggest Red, low brightness, as I had an Iscan Pro with a Blue LED that used to annoy me – it's a matter of taste I suppose.

Parts List:

Semiconductors

LM358 X 1

LM1881 X 1

MAX497 X 1

LM7805 X 1

BC548 X 4

IN914 X 2

IN4001 X 1

3.3V Zener 1W OR LM336-2.5 (In a TO-92 Package) Zener is easier.

LED of your choice

Resistors (all 1/4W metal film except 0 Ohm links, which are carbon)

0 Ohm Links X 5

75 Ohm X 7

560 Ohm X 3

1K Ohm X 5

47K Ohm X 1

100K X 3

680K X 1

Capacitors:

0.01uf MKT X 1

0.1uf MKT X 6

100uF Electrolytic 25V X 4

Miscellaneous:

Reed Relays, DIL package, 12V 1K Ohm coil resistance X 5

PCB Mount BNC Sockets (Amphenol 31-5431-2010, DigiKey ARF1065NW-ND)

8 Pin DIP Dual Wipe IC Sockets X 2 (NOT MACHINE PIN)

14 Pin DIP Dual Wipe IC Sockets X 5 (NOT MACHINE PIN)

16 Pin DIP Dual Wipe IC Sockets X 1 (NOT MACHINE PIN)

64 Pin Male DIN 41612 Rows A&C 90 Deg. PCB (Populated ABC these are 96 pin)

Nuts + Bolts 3mm for DIN connector and 7805 mounting.

My Thoughts, Circuit Limitations and Further Modifications:

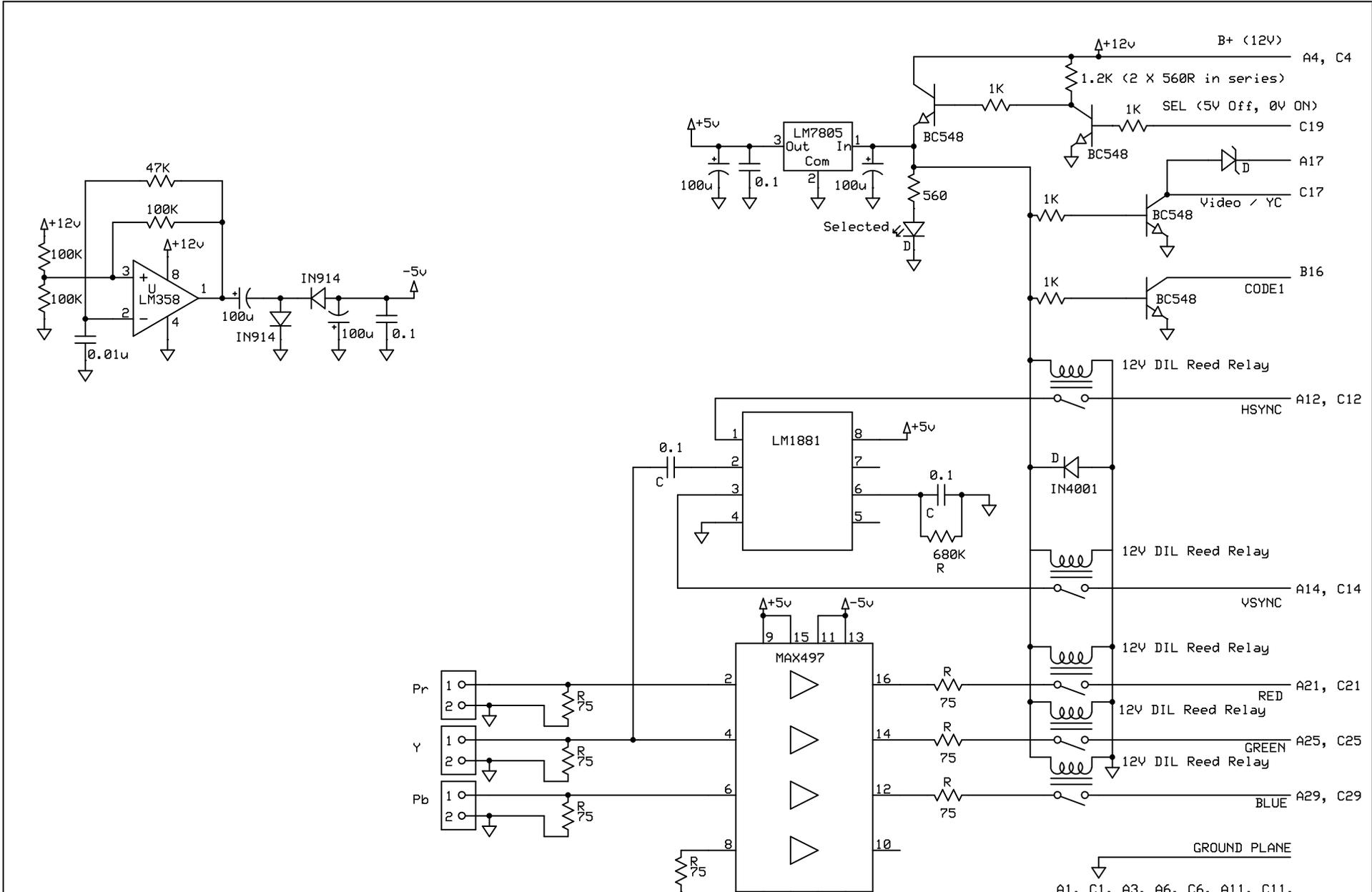
My selection of the MAX497 and LM1881 was based simply on their availability at the local electronics. A better way of doing this would be to use a single rail video grade op-amp, like a MAX4383/4451, and a surface mount sync separator like a GS4881. Both are surface mount, so a total board remake would be in order. An LM2662 would be a far better choice for board real-estate / footprint as well than the charge pump shown here

I don't claim to be the best PCB designer for video, so some of the track layouts may be less than ideal, but this is more likely to happen at higher bandwidths (higher than what the projector can accurately resolve anyway).

The other thing that has been neglected is the 'Protection' signal to the projector. This I feel is not necessary, as the 7805 is self limiting, and the current capabilities of the BC548's would ensure their destruction far before any harm would befall the projector.

Removal of the video buffers would seem to simplify the circuit, but the nature of DVD players (most are double-insulated) means that there is often a differential voltage of up to 120V between the video outputs and the (grounded) projector. I know I got some nasty little tingles from my LG PVR until I grounded the case. These voltages, although the current is negligible, could damage input circuitry. You have been warned.

The attached schematics were used for building the working unit I have, so there should be no transcription errors (I hope).



- A1, C1, A3, A6, C6, A11, C11,
- A16, C18, A20, C20, A22, C22,
- A24, C24, A26, C26, A28, C28,
- A30, C30, B31, A32, C32

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