



*Z8612900100ZCO*

*Line 21 Decoder Demo Board Kit  
for Z86129/130/229/230*

**User Manual**

Preliminary

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**ZiLOG Worldwide Headquarters**

532 Race Street

San Jose, CA 95126-3432

Telephone: 408.558.8500

Fax: 408.558.8300

[www.ZiLOG.com](http://www.ZiLOG.com)

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## *Safeguards*

The following precautions must be observed when working with the devices described in this document.



**Caution:** Always use a grounding strap to prevent damage resulting from electrostatic discharge (ESD).



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## Introduction

This document describes the Z8612900100ZCO Demo board kit, based on the eZSelect Vertical Blanking Interval (VBI) reference design. Included are the kit contents, key features, systems configuration and both hardware and Demo Program software installation. The schematic drawings are included at the end of this document.

## Kit Contents

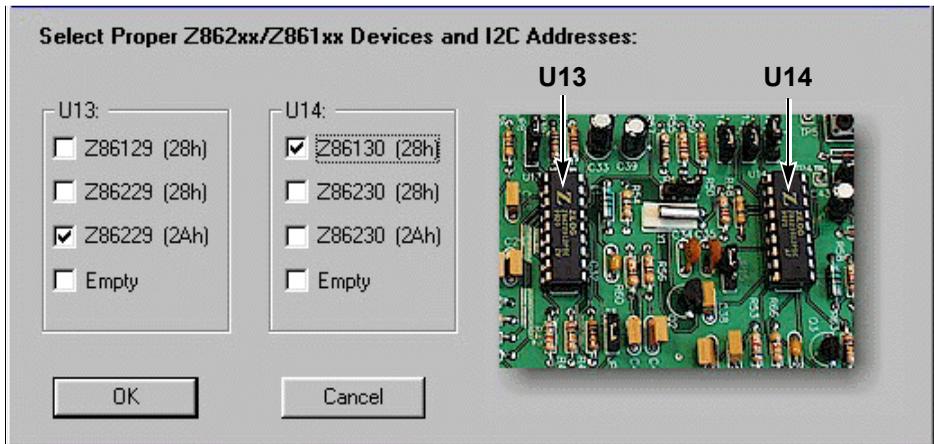
The Z8612900100ZCO Demo Board Kit contains the following:

- One Z86229/Z86230 Demo Board
- One 9VAC adapter
- One DB25 pin (M-F) cable for printer port connection
- Demo Program software
- User Manual
- Application Note

## Key Features

- The Z86229/230 board design is a 2-chip design so the user can evaluate the ZiLOG Line 21 Decoders in any of the following combinations (see Figure 1):

	1	2	3	4	5	6	7
U13	Z86129	Z86229	empty	empty	Z86129	Z86229	Z86229
U14	empty	empty	Z86130	Z86230	Z86230	Z86130	Z86230



**Figure 1. Device Selection Screen**

- Direct reset control (SW1) for Z86230
- Program Block LED (LED1) to indicate hardware program blocking
- Powered by a single 9VAC/600mA adapter
- Direct printer port connection to your PC
- Additional H<sub>SYNC</sub> and V<sub>SYNC</sub> outputs for the applications
- Crystal or H<sub>SYNC</sub> timing support for Z86130/Z86230
- H<sub>SYNC</sub> source selectable from U2 or Video Input.
- 100% compatible with the previous Z86129 Demo Board through jumper JP5

## System Configuration

The system configuration used by the Demo board is flexible and supports many different applications. It is 100% backward compatible with ZiLOG's older Z86129 Demo Board.

Figure 2 illustrates a typical system configuration of the Z86229/Z86230 Demo Board.

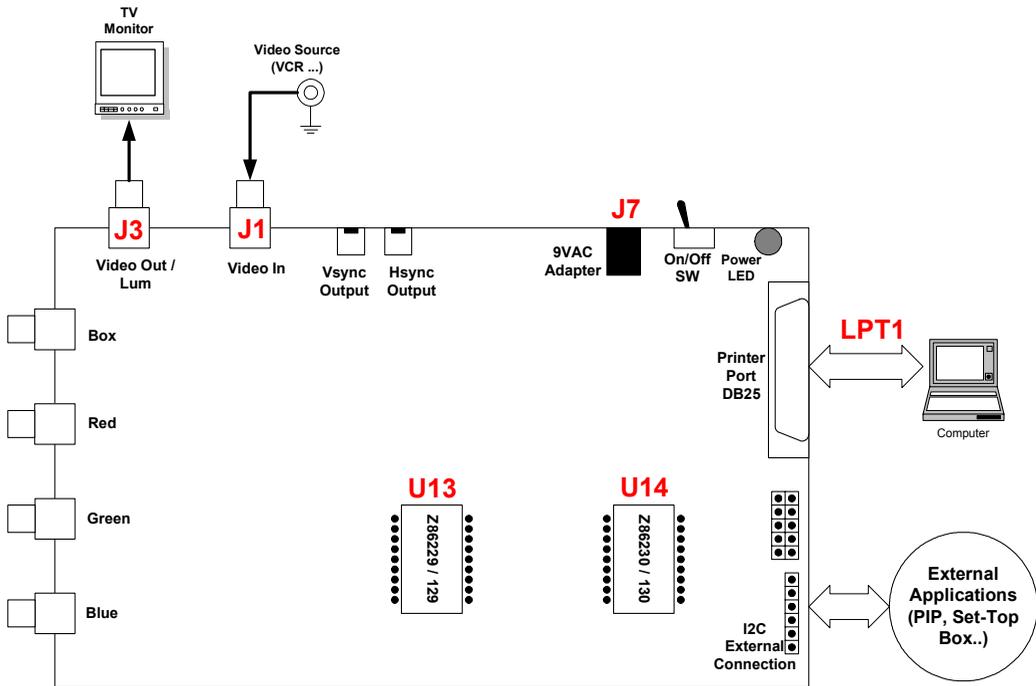


Figure 2. Demo Board System Configuration

## Hardware Installation



**Caution:** Always use a grounding strap to prevent damage resulting from electrostatic discharge (ESD).

To install the Demo Board and verify the board's operation, use the following procedure:

1. Insert the video source (video composite signal) to J1 (Video In).

2. Connect J3 (Video out/LUM) to the TV monitor.
3. Plug the adapter into J7.
4. Connect the DB25-pin cable to your PC printer port (LPT1).
5. Ensure that the Z86129/130/229/230 devices are in the appropriate U13 and U14 sockets depending on the configuration.
6. Flip the ON/OFF Switch (SW2) to ON. The red Power LED lights up.
7. Observe the video on the TV monitor from J3 to verify that the board is working properly.
8. If necessary, use the oscilloscope to check all the signals on the Test Points (TP).
9. Install the Demo Program from the Demo software disk onto the PC. On the windows screen, select the items to test, then verify the features.

Figure 3 depicts the Power LED, the Program Blocking LED, the jumper locations and test point locations.

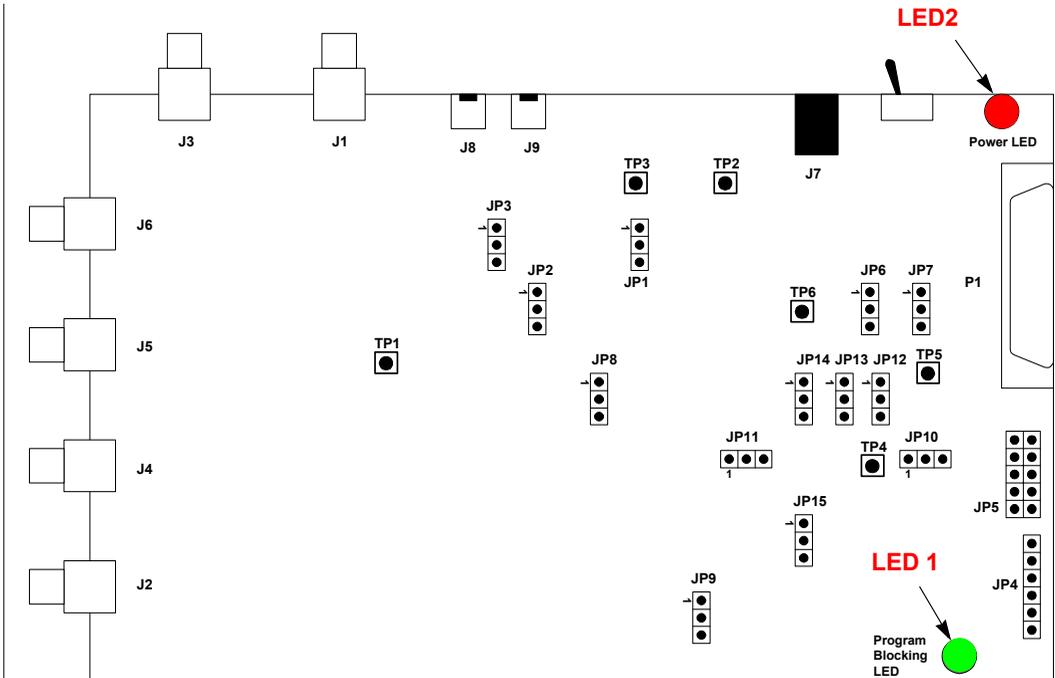


Figure 3. LEDs, Jumpers and Test Points

## LED Operation

- Program Blocking LED (LED1):  
Pin 13 of Z86130/Z86230 (U14) activates this LED. This LED indicates if the current TV program is blocked based on the preset program rating conditions.
- Power LED (LED2):  
This LED indicates whether the power is On or Off. Power is on when the LED is lit.



## Test Points

Several Test Points available on the board verify the following signals.

- TP1—Video Signal Input
- TP2— +5V
- TP3— -5V
- TP4—U14, Pin 13 (PB output)
- TP5—I<sup>2</sup>C SDA (data signal)
- TP6—I<sup>2</sup>C SCK (clock signal)

## Jumper Settings

JP#	Function	Pins 1-2	Pins 2-3	NC (No Connect)
JP1	H <sub>SYNC</sub> Source Selection	Video In	<b>LM555</b>	
JP2	H <sub>SYNC</sub> Polarity	Negative	<b>Positive</b>	
JP3	V <sub>SYNC</sub> Polarity	<b>Positive</b>	Negative	
JP4	Connects external applications such as Picture-in-Picture circuit or Digital Set-Top Box to the Demo Board			
JP5	Connects the host PC to the Demo Board using the original ribbon cable.			
JP6	I <sup>2</sup> C Clock Selection	<b>To Printer Port</b>	W/ 4.7K pull-up resistor	Use for former Z86129 Demo Board cable
JP7	I <sup>2</sup> C Data Selection	<b>To Printer Port</b>	W/ 4.7K pull-up resistor	Use for former Z86129 Demo Board cable
JP8	I <sup>2</sup> C Address Selection for Z86229	<b>28h (W)</b>	2Ah (W)	
<b>Bold</b> – Denotes default settings				

JP#	Function	Pins 1-2	Pins 2-3	NC (No Connect)
JP9	V <sub>SYNC</sub> in or INTRO out	Interrupt Output	<b>V-Sync Input</b>	
JP10	PB or INTRO out	<b>PB Output</b>	Interrupt Output	
JP11	Timing Reference Selection	H <sub>SYNC</sub> Input	<b>Crystal</b> (32.768KHz)	
JP12	Reset Selection for Z86230	<b>Reset Circuit</b>	From Printer Port (Z86130)	
JP13	H <sub>SYNC</sub> In Selection	Use H <sub>SYNC</sub> Input	<b>Use Crystal</b>	
JP14	I <sup>2</sup> C Address Selection for Z86230	28h (W)	<b>2Ah (W)</b>	
JP15	Z86230 Ground Selection	<b>For Z86230</b>	For Z86130	
<b>Bold</b> – Denotes default settings				

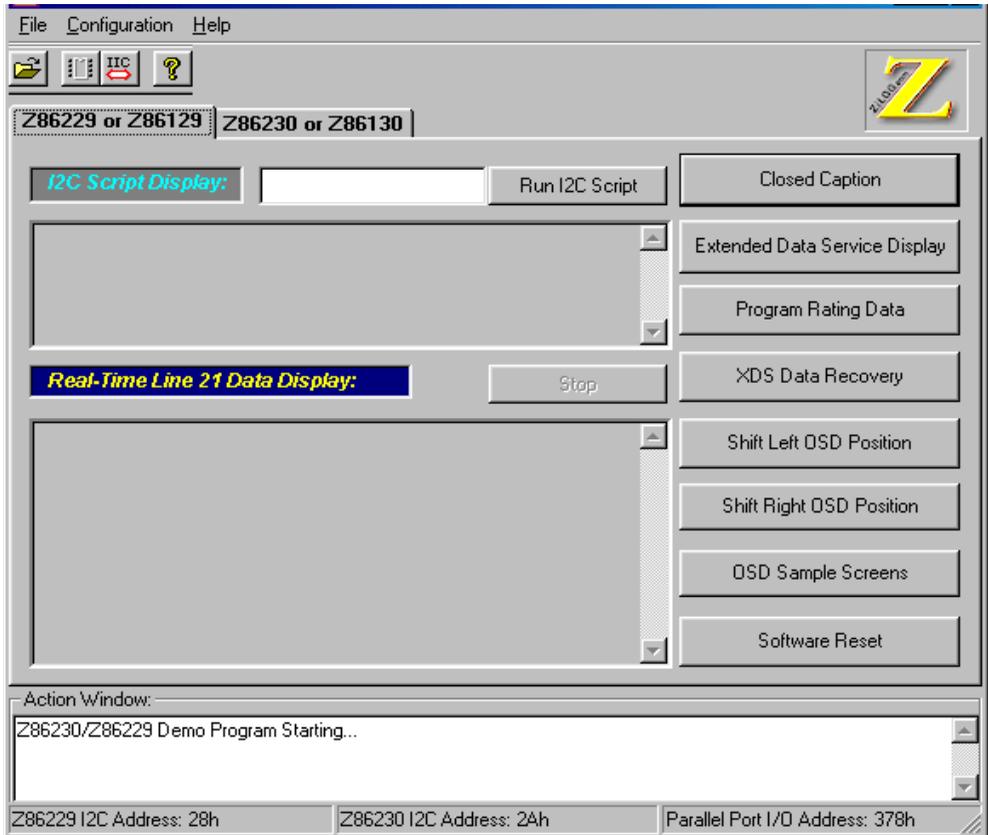
## Demo Program

The Z86229/230 Demo Program supports the eZSelect data decoder reference design. Because the eZSelect VBI decoders are application-specific devices and not like microcontrollers, there are only two ways to communicate with them: the I<sup>2</sup>C and SPI buses. The Demo Program acts as the controlling firmware and uses a PC as the main host controller to send commands to the Z86229/Z86230 devices. The Demo Program also conveys data from the reference design to the PC monitor. The following procedure describes how to install and use the Demo Program.

## Software Installation

The Z86229/Z86230 Demo Program is contained on the demo software CD. Follow the instructions on the screen to finish the installation.

When the installation is complete, click the Z86230db.exe icon to run the program. The following screen appears (Figure 4).



**Figure 4. Z86229/Z86230 Demo Program Main Screen**

The Action Window section of the screen displays the following message to indicate that the program has been started successfully:

```
Z86229/Z86230 Demo Program Starting...
```

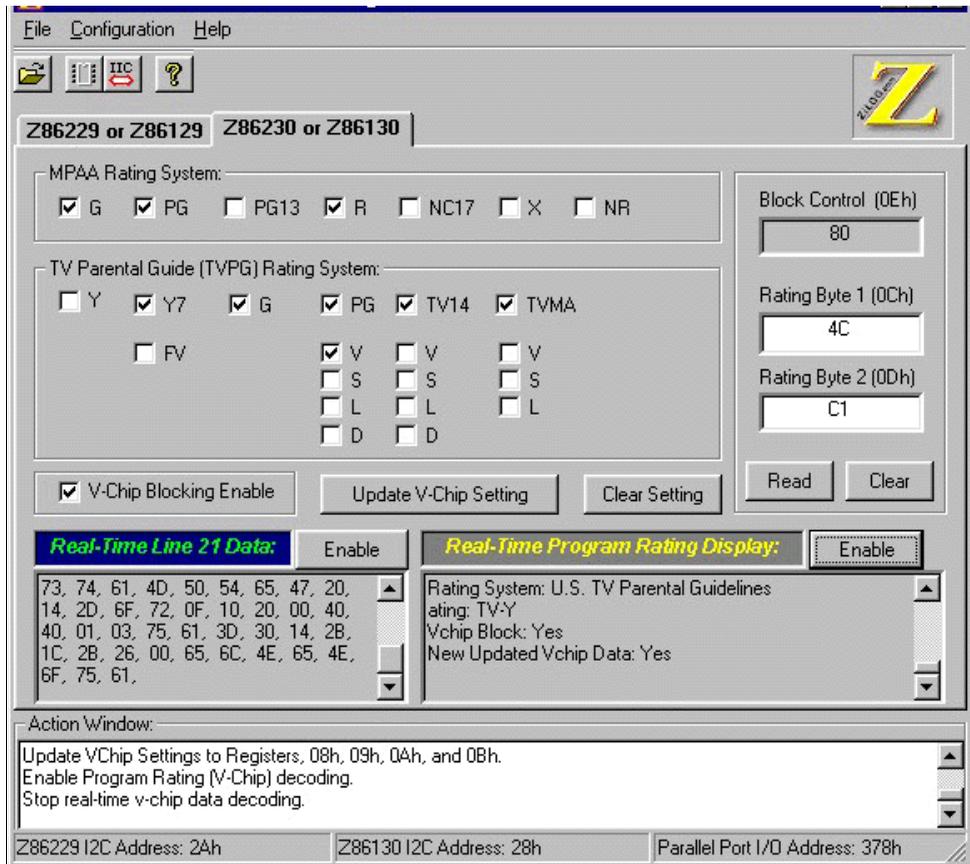


The Status Bar at the bottom of the screen sets the I<sup>2</sup>C addresses to their default values. The default for Z86229 is 28h and the default for Z86230 is 24h. The program detects the parallel port I/O address to be 378h.

Select the Z86130/Z86230 tab to begin using the program to communicate with the reference board and evaluate features.

### **Z86130/Z86230 Program Blocking**

Figure 5 depicts the Z86130/Z86230 program blocking feature selection screen.



**Figure 5. Z86230/Z86130 Program Blocking Selection Screen**

Use this screen to:

- Write and read MPAA and TV-PG rating systems by clicking on the Update V-Chip Setting and Read buttons
- Display, in real time, program rating information

- Display, in real time, raw data from Line 21 on both even and odd fields of the video signal

## Z86129/Z86229 Program Blocking

Figure 6 depicts the Z86219/229 program blocking feature selection screen.

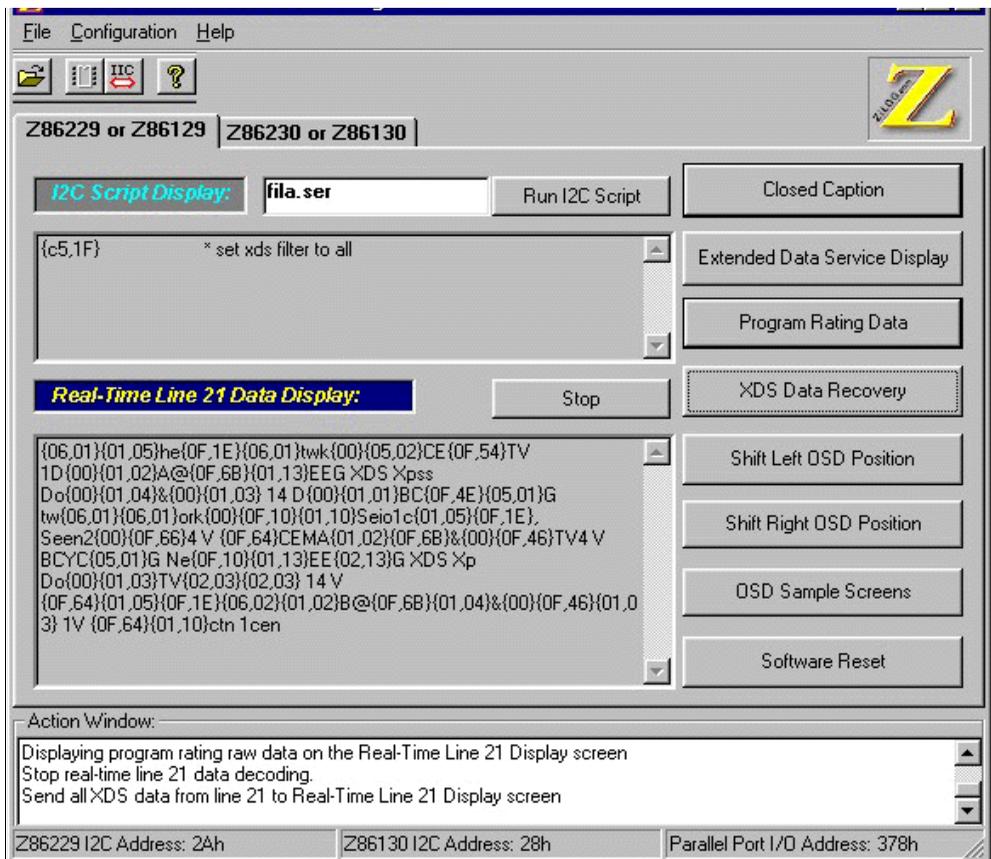


Figure 6. Z86129/Z86229 Program Blocking Selection Screen

This screen displays several function buttons including: Closed Caption, Extended Data Service Display, Program Rating Data, XDS, OSD buttons and Software Reset. It also displays, in real time, data for Line 21.

The I<sup>2</sup>C Script Display window shows the current I<sup>2</sup>C script file and the contents of the script. These displays help the user understand which types of commands are issued in the script to generate these functions. The Real Time Line 21 Data Display window lists Line 21 XDS activities. This screen also displays program rating raw data, for example {01, 05} {68, 65}.

## Device I<sup>2</sup>C Address Selection

Because the Z86229 and Z86230 have two selectable I<sup>2</sup>C addresses, each eZSelect VBI decoder that is inserted on the Demo Board must be preset to the correct I<sup>2</sup>C address. Figure 7 depicts the Device Selection screen. Use this screen to configure devices and set the correct I<sup>2</sup>C addresses.

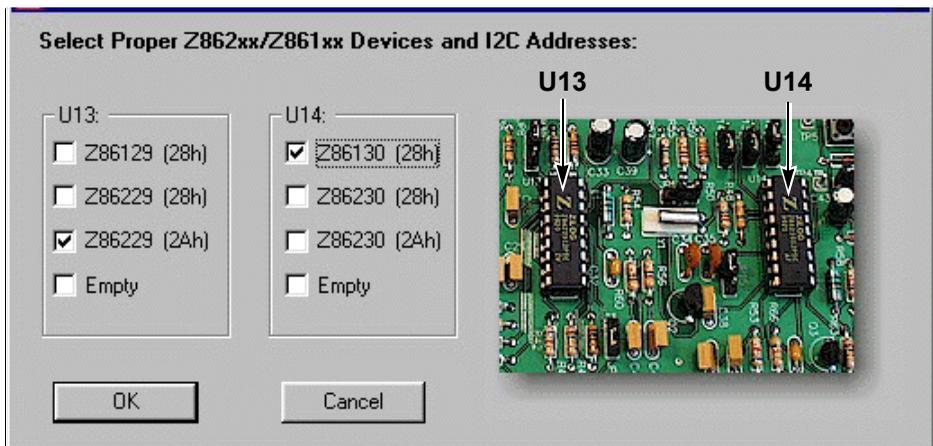


Figure 7. Device Selection Screen

Any combination of devices on the board can be selected. The Status Bar at the bottom of the main window displays the current device selections after exiting this screen.

## I<sup>2</sup>C Script Files

The user can build and load I<sup>2</sup>C script files quickly by selecting the Open Script File tool (see Figure 8).

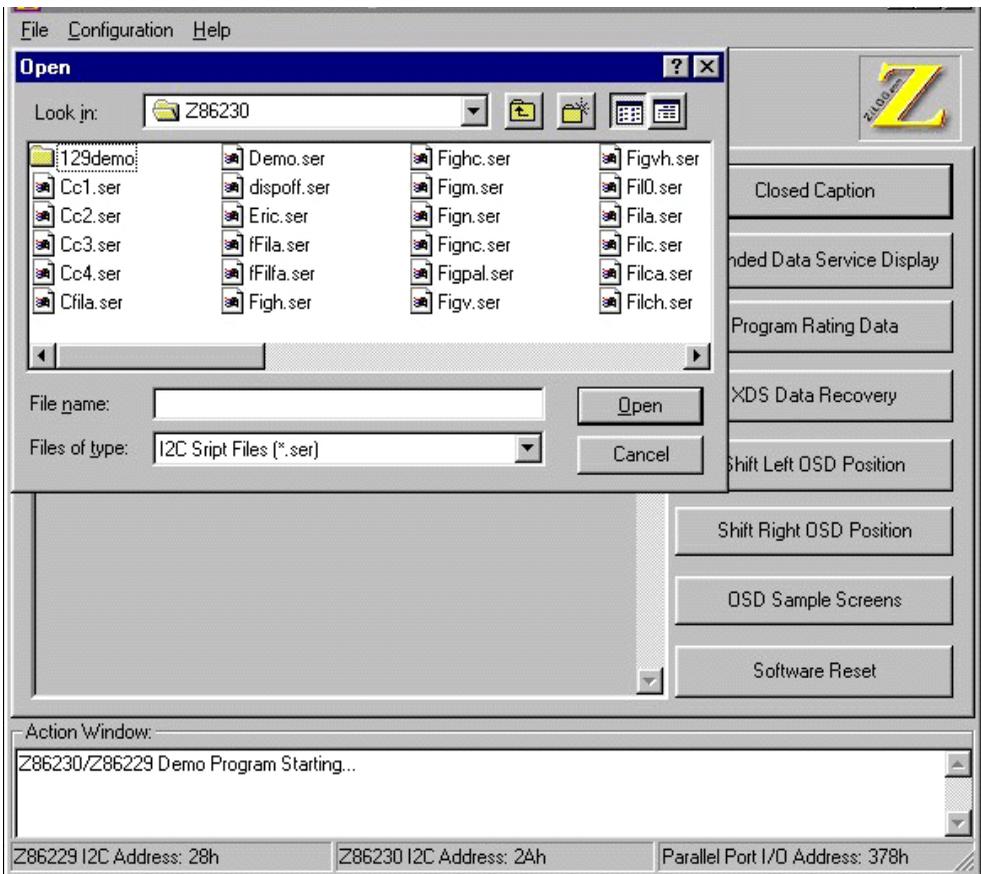


Figure 8. Open I<sup>2</sup>C Script File Tool

## Action Window

The Action Window tracks the entire programming session to the developer can track the history of command events. In both the Z86130/Z86230 and the Z86129/Z86229 screens, the Action Window always displays in the lower area of the screen to show the current command event. Figure 9 is a sample Action Window.

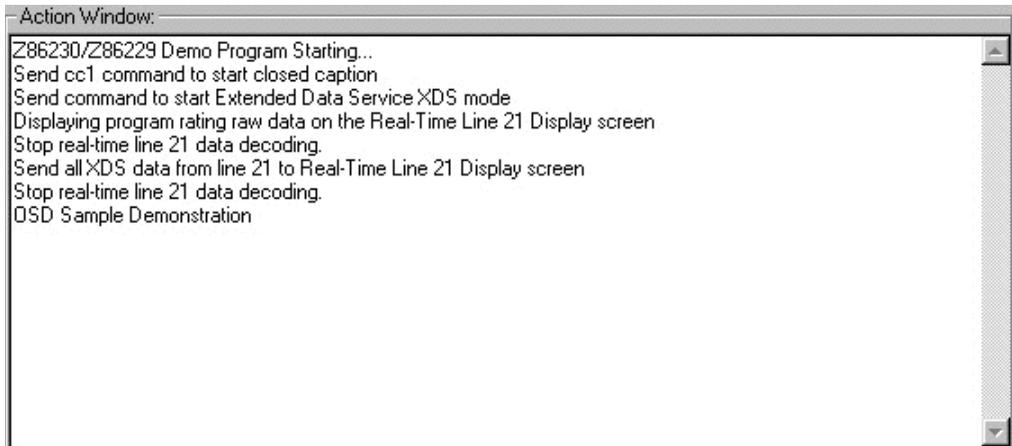


Figure 9. Example Action Window

## Device Differences

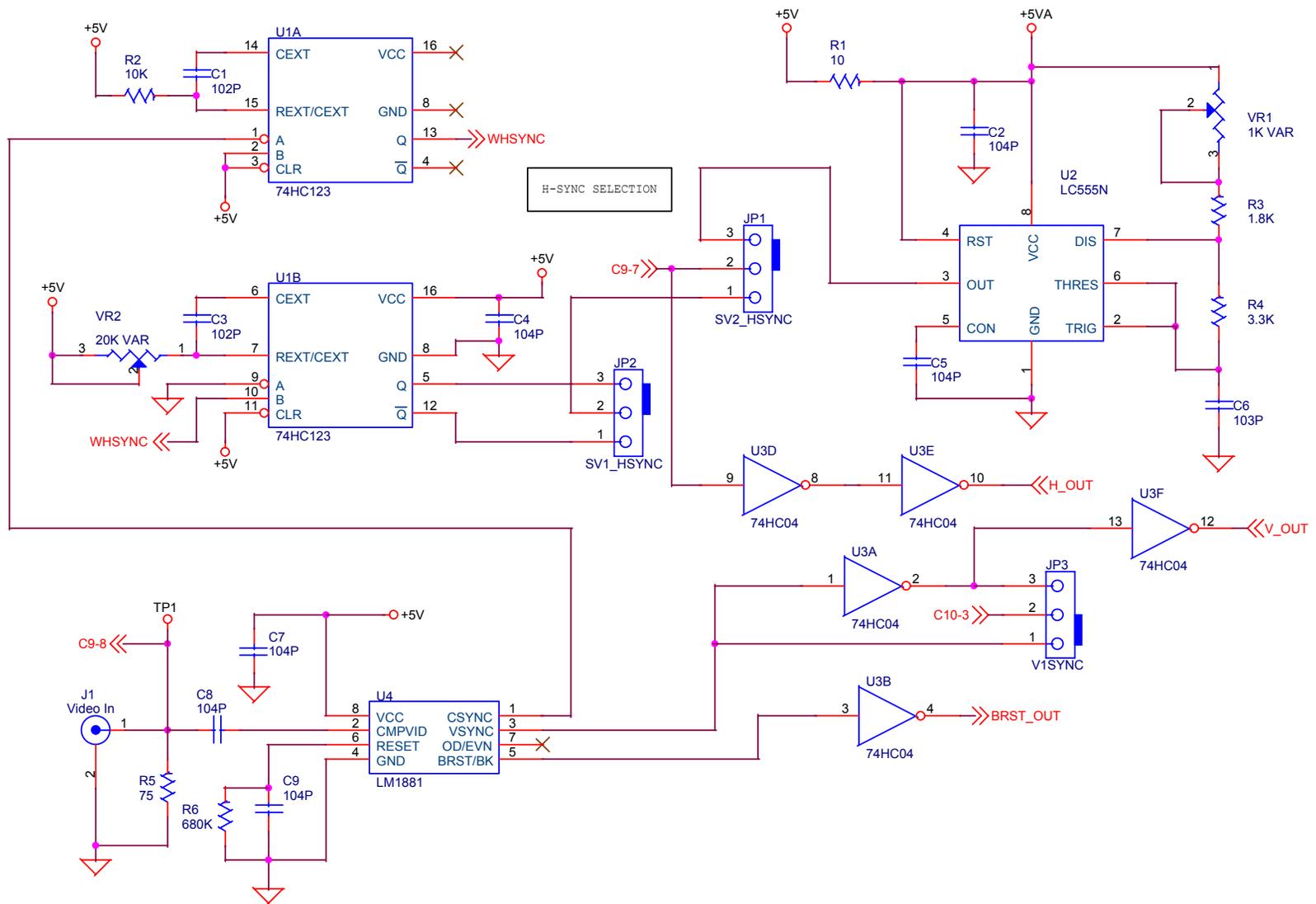
Because ZiLOG has improved and expanded its series of decoding devices over the years, many of the enhancements and improvements affect only certain devices. The following table lists features that can help customers select the correct device for a specific application.



Application	Z86129	Z86130	Z86229	Z86230
OSD Display (RGB output) for Closed Caption	*		*	
Hardware Reset (pin 4 NRST)				*
Software Reset (I <sup>2</sup> C commands)	*	*	*	*
Canadian Rating Systems				*
MPEG and TV-PG Rating Systems		*		*
XDS Data Decoding	*	*	*	*
Up to 32 bytes of I <sup>2</sup> C writing without checking the RDY bit from the Serial Status Register (SSR)				*
Supports two I <sup>2</sup> C slave addresses selection			*	*
Program Blocking (PB) signal output		*		*
Dedicated INTRO (Interrupt) output				*
H <sub>SYNC</sub> Input or Crystal (3.57KHz) selection for timing reference		*		*

## Schematics

The reference circuits for the Demo Board board consists of five functional main circuits. Figures 10 through Figure 14 are schematics of these circuits.



■ : Default Jumper Setting

Figure 10. Video Front End Schematic

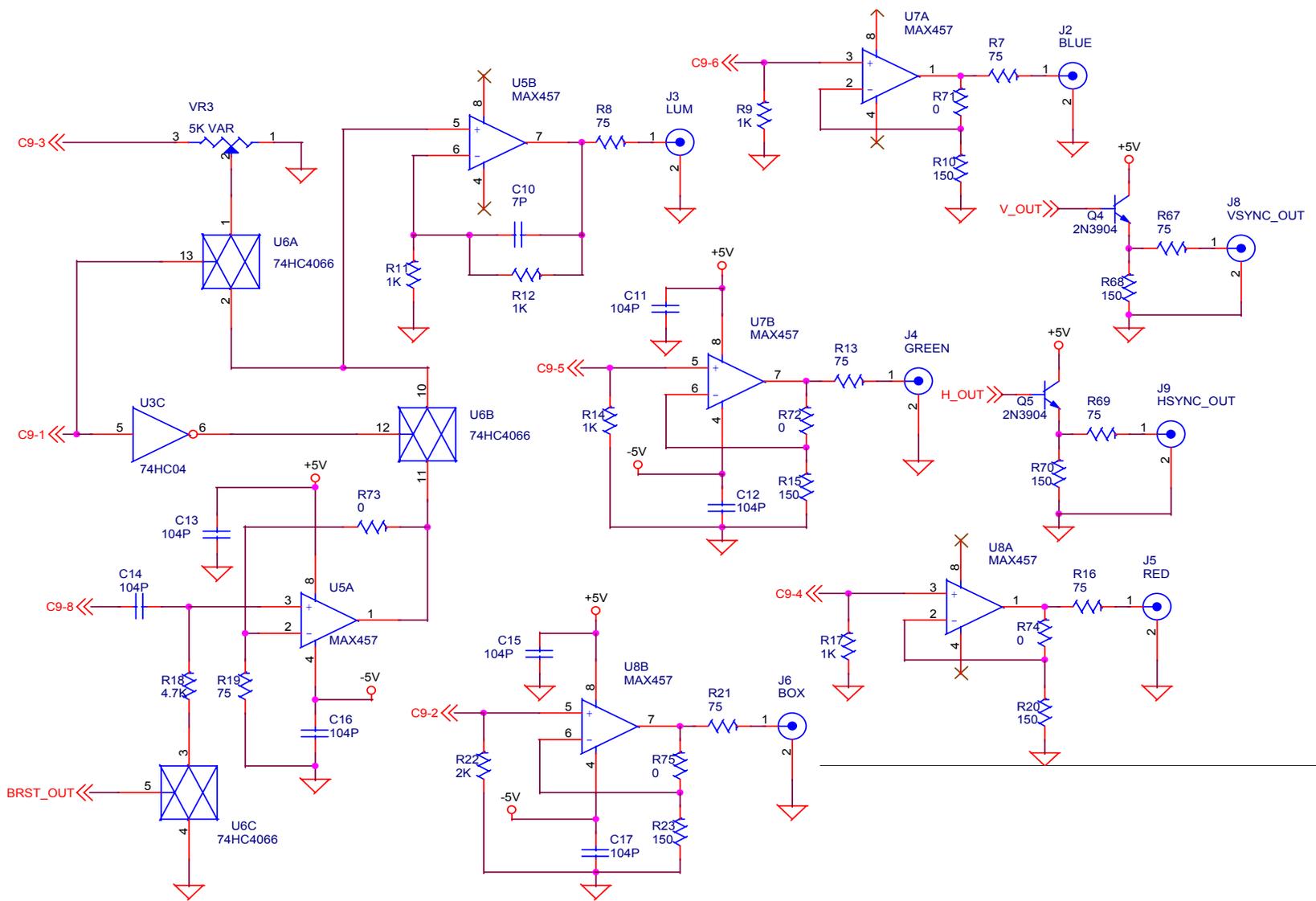


Figure 11. RGB Out Schematic

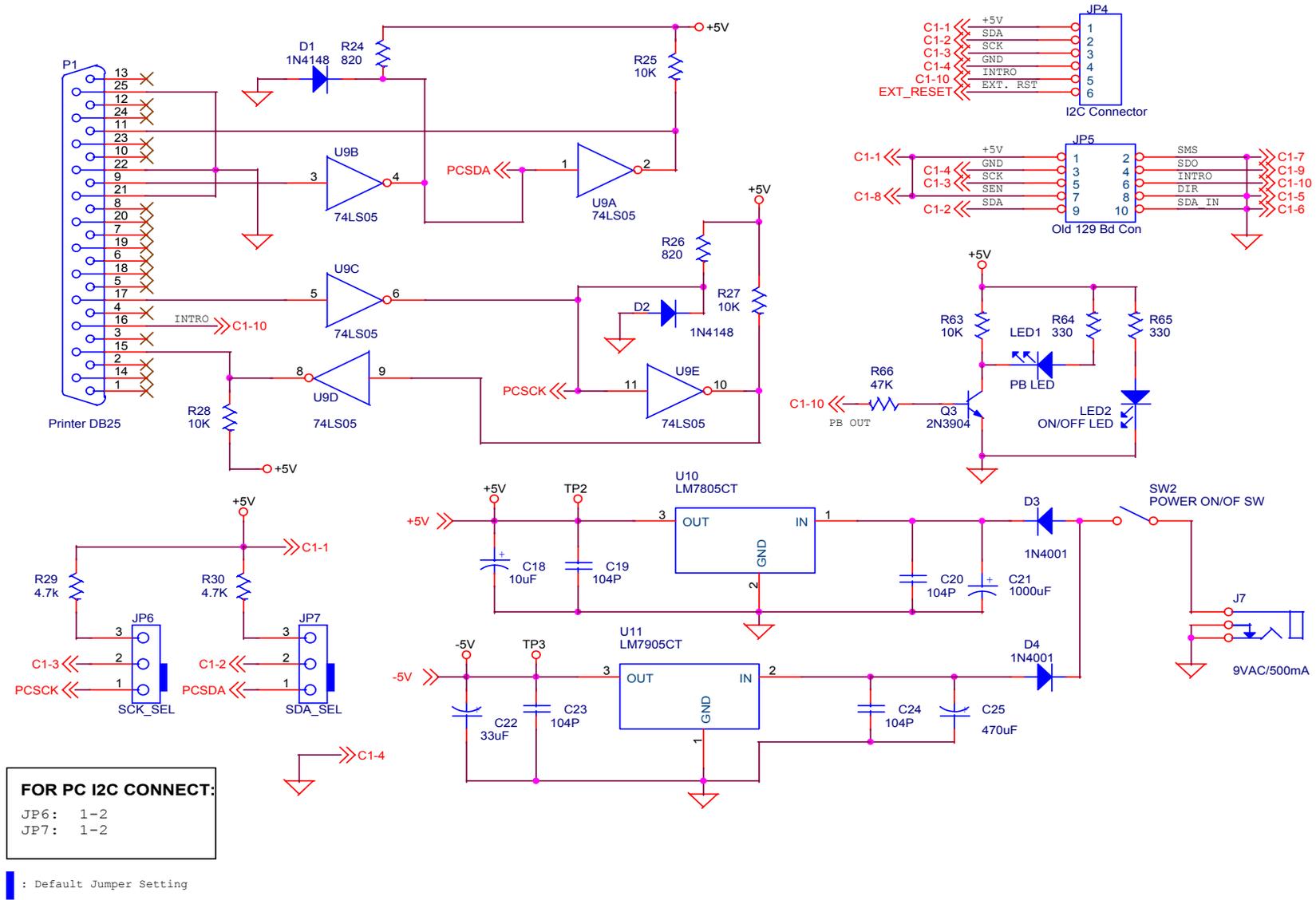
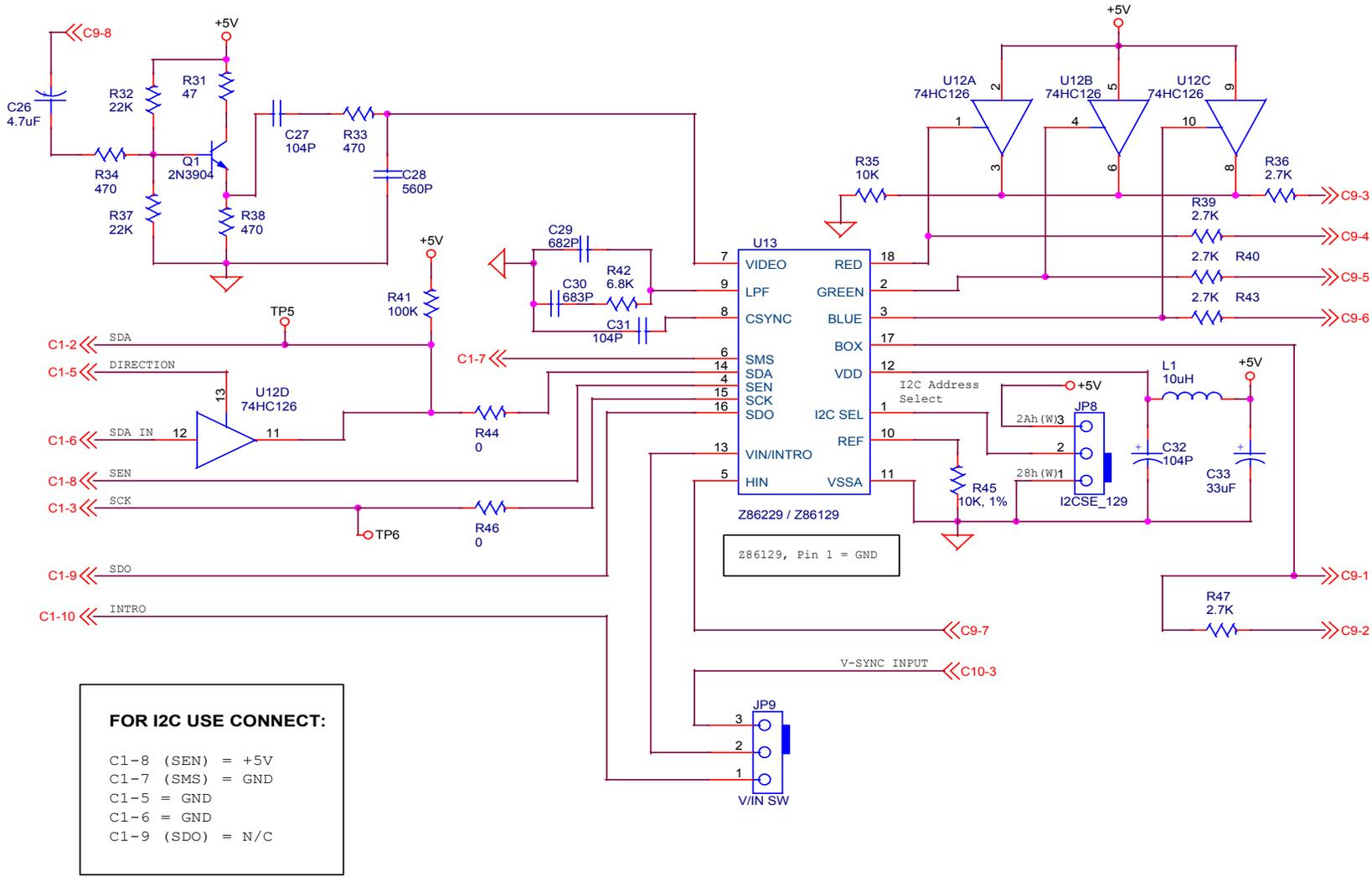


Figure 12. Power Supply and PC Interface Schematic



■ : Default Jumper Setting

Figure 13. Z86129/229) Module Schematic

