GIL SYLVANIA INCORPORATED SERUICE

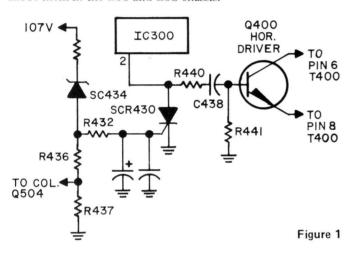


VOLUME 11 ISSUE 7 NOVEMBER 1974

SHUT DOWN CIRCUITS ARE PUZZLING

(ESPECIALLY WHEN THEY ARE SHUT DOWN) Al Hendlin, FSDM, Orange, Conn.

Here is some light shed on the subject to give a better understanding of what they are, what they do, and how to trouble shoot them in the E06 and E08 chassis.



A problem in the high voltage, the low voltage, or the horizontal circuit will result in the same symptom, i.e., no raster, no pix, no sound . . . a "dead" set. This is due to the safety shutdown circuit, and the fact that other voltages are derived from the flyback.

Before looking at a service approach it might be well to review the operation of this circuit.

The heart of the shutdown circuit is a silicon controlled rectifier (SCR). Unlike a regular diode, an SCR will not conduct when voltage is applied across it. It has a third element, the gate, and like the base of a transistor, voltage must be applied to this gate to start conduction. Unlike a transistor, however, once conduction starts the diode will continue to conduct, even though the gate voltage is removed.

A look at a partial schematic (Figure 1), shows that the SCR is tied from the base of the horizontal driver to ground. Under normal conditions the SCR is "open", and has no bearing on the operation of the set.

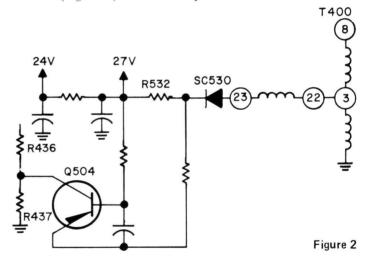
The regulated 107V line feeds the horizontal output transistor and is the determining factor in the amount of high voltage. Should this 107V line tend to rise, causing a resulting rise in high V, the zener diode, SC434 would conduct. Conduction would be through R437 and R436 placing a positive voltage on the gate of the SCR, turning it on. As soon as the SCR

conducts, it shorts Q400 base drive to ground. This holds the driver off and shuts down the high voltage. Since rectified horizontal pulses from various windings on the flyback transformer supply the 27 volt and 170 volt sources, these are also shut down, resulting in a "dead" set.

The +107 (E06), +112 (E08) feeds 4 circuits:

- 1. IC400 through R404.
- 2. Zener diode SC434.
- 3. Horizontal driver Q400.
- 4. Horizontal output Q402.

Problems in the 24 volt and 27 volt lines will also shut down the set. (Figure 2.) This is accomplished as follows:



Under normal circumstances Q504 is not biased on. However, should there be a problem in either the 24V or 27V circuits, more current would flow through R532. This would establish sufficient forward bias for Q504 and it would conduct. Current through Q504 flows through R437. The voltage drop across this resistor is sufficient to turn on SCR430, shutting down the horizontal and therefore, the rest of the set. Again the symptom would be a "dead" set.

First, the +27 (E06), +29 (E08) feeds:

- 1. Audio Output and driver.
- 2. Vertical output.
- 3. Vertical driver IC302.
- 4. Current limiter Q504.

Next the +24V (E06 and E08) feeds all the other signal cir-

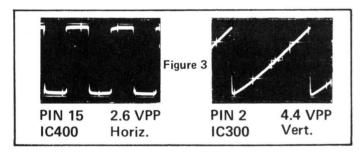
cuits. This buss line has 3 sections connected by two staples. When the set is normal, the 24V buss resistance to ground is 200 ohm. Should this resistance read less than 200 ohm, check the 27/29V buss. Normally, its resistance should be 200 ohm plus R530 (15 ohm, E06) (24 ohm, E08).

It is obvious that should there be no horizontal drive, or a defect in the driver or output stages the result would be the same.

With perhaps a slightly better insight into the whys and wherefores of the shutdown circuit, let's look at some troubleshooting techniques.

Obviously, in approaching the servicing of a "dead" set, the first item to check is whether or not the set is dead or merely shut down. A reading of approximately 130 volts at the collector of Q502, the B+ regulator, checks the On/Off switch, the circuit breaker and the 140 volt rectifier circuit. Following this the active devices, horizontal driver, horizontal output, regulator driver, and B+ regulator should be checked; for these are the most likely suspects and the easiest to check.

The horizontal oscillator itself can best be checked by a 'scope reading'. A pulse should be present at pin 15 of IC400, and at pin 2 of IC300. (Figure 3.) A lack of this waveform is indicative of either a defective chip or a component associated with the chip.



Should all of the above items check out the shutdown circuit should be checked. An ohms reading from the 24/27 volt line will read about 175-200 ohms, from the 107 volt line about 2K, and from the 170 volt line about 35K.

If all of the above appear to be OK, and the shutdown circuit still seems to be the cause, it must be determined whether the shutdown was triggered by a problem in the 24/27 volt line or in the horizontal circuit. One way of determining this is to remove Q504, the 27 volt current limiter. If high voltage returns the trouble is in the 24/27 volt line, and troubleshooting should proceed along these lines. Remember, since the SCR shutdown continues to conduct even after the gating voltage is removed, Q504 must be removed before the set is turned on. If high voltage and other voltages are not restored by this method the problem is most likely in the horizontal circuit. Removing the SCR itself will eliminate the shutdown circuit, and servicing of the horizontal and high voltage can proceed along conventional lines.

CAUTION...Both Q504, the current limiter, and SCR SC430, the shutdown circuit, are safety devices...included to protect both the set and the owner. Care should be taken not to operate the set for any length of time without them. Care should also be taken not to alter or eliminate either circuit.

These service procedures can be used as a guide. Undoubtedly, you will soon establish your own methods, once familiar with the circuitry.

IN THANKSGIVING

The richest man, if poor in spirit, sits down to a feast on a silver plate and rises after dining poorly.

The poorest man, if rich in spirit, sits down to a barren table for his crust of bread and cheese and rises with a grateful heart for his feast.

CORRECTION TO E11-1,-3,-4 BULLETIN, PAGE 4.

BRIGHTNESS RANGE

- 1. Tune to a normal broadcast signal.
- 2. Set CONTRAST Control to mid-range.
- 3. Set User BRIGHTNESS Control (R905) to minimum.
- 4. Adjust BRIGHTNESS RANGE Control (R949) so that picture highlights are just visible.
- 5. Restore user CONTRAST and BRIGHTNESS Controls for a normal picture on a good quality broadcast.

Notes from the Field

B10-12 CHASSIS. NO VERTICAL SYNC AFTER APPROXIMATELY ONE HOUR OF OPERATION.
C314 shorted.

B10-12 CHASSIS. NO HIGH VOLTAGE. C416 shorted.

B10-12 CHASSIS. SLOW VIDEO AND SOUND BUT SCREEN LIGHTS UP NORMALLY; ALSO INTERMITTENT HORIZONTAL SYNC. C430 leaky.

D16 CHASSIS. NO CHROMA.

R658 decreased in value - reads about 50 ohms to ground.

D16 CHASSIS. NO COLOR SYNC. C670 open.

D18 CHASSIS. INTERMITTENT VIDEO AND SOUND. Foil broken between R316 and R322, 20 volt source.

D19 CHASSIS. INTERMITTENT SOUND.

L104 sound detector coil leads were not soldered to terminal posts.

E03 CHASSIS. NO VIDEO, NO CONTROL OF BRIGHTNESS, SOUND OK.

Junction of R508 and Section "A" of C508 shorted to R987 and R984 on terminal strip.

 ${\tt E03}$ CHASSIS. NO VIDEO, NO SNOW, SOUND OK, HEAVY RETRACE LINES.

Emitter/Base Q210 open.

Fred Miller, Service Mgr., Mitchell-Powers Hardware Co., Inc., Bristol, Tennessee.

D14-14 CHASSIS. PICTURE LOST COLOR GREENS AT RANDOM, REDS TURNED PINK - NO LOSS OF COLOR INTENSITY.

C688 intermittently open, problem could last two minutes to two hours, might not occur in days (capacitor across secondary T606). Got clue when Q606 and Q608 voltage went from a normal of 27 volts at collector, to 36 volts.

H. Weldin, Weldin, Brown and Dale, Inc., Wilmington, Del.

D16 CHASSIS. OSCILLATION IN SET CAUSES INTERFERENCE IN OTHER SETS. DISABLING DEFLECTION CIRCUITS, TUNER, AND I.F. DOES NOT HELP. "TOUGH DOG".

R682 (47K, 2W) had decreased to 10K.

McLain & Son, Columbus, Ohio.

E06 CHASSIS. CRT APPEARS BAD (VIDEO PROBLEM). Service switch is extremely sensitive and can easily be jarred out of position. Check switch carefully.

Ed's TV, Milton, Delaware.

E03/04/05 CHASSIS. CIRCUIT BREAKER KICKS OUT. Q406 short and T400.

R. Lopez, TV Service Center, Las Cruces, New Mexico.

A120101 CHASSIS. VERTICAL ROLL UNABLE TO STOP. R312 changed value from 10K to 30K.

E080103 CHASSIS. SNOW WITH NO ANTENNA. CLEAR RASTER AND SOUND WITH ANTENNA. Q202 leaking E - C.

D161567 CHASSIS. DRIVE LINE IN LEFT CENTER OF PICTURE. (PICTURE SEEMS TO BE PINCHED TOGETHER IN THIS LINE.)

Open capacitor C422, 470PF, going to pin 2 of horizontal oscillator tube (6BL8) and L400 frequency coil.

E05 CHASSIS. RETRACE LINK ABOUT 1 1/2" WIDE JUST BELOW CENTER SCREEN JUST TO LEFT OF CENTER SCREEN.

Bottom vertical output - Q310.

E09 CHASSIS. ABOUT 1" VERTICAL DEFLECTION WITH NORM/SERV SWITCH IN SERVICE POSITION.

Negative lead of C346 broken off at body of capacitor.

E10 CHASSIS. CIRCUIT BREAKER TRIPS EVEN WITH SET TURNED OFF.

SC524 shorts on IF panel.

E100100 CHASSIS. TRIPS BREAKER. SC530 shorted.

E110100 CHASSIS. NO SCREENS. Shorted SC445.

Empire State Wholesalers, Inc., Latham, New York.

ZENER DIODE REFERENCE

3.6V	Syl. Spec.	Part No.	ECG Spec.	EGC No.
4.3V 13-33187-19 5V 13-33187-12 7.5V 13-14879-4 7.5V, 1W 138 10V 13-33187-6 10V, 1W 140 10V 13-33187-6 10V, 1W 140 10V 13-33187-7 10V, 1W 140 12V 13-33187-11 15V, 1W 142 12V 13-33187-11 15V, 1W 145 15V 13-14879-1 15V, 1W 145 16V 13-14879-2 15V, 1W 145 16V 13-14879-5 16V, 1W 5075 20V 13-14879-6 20V, 1W 5079 20V 13-3187-6 20V, 1W 5079 20V 13-33187-3 20V, 1W 5079 20V 13-33187-3 20V, 1W 5079 21V 13-33187-9 22V, 1/2W 5030 24V 13-33187-9 22V, 1/2W 5030 24V 13-33187-16 28V 13-33187-16 33V 147 28V 13-33187-5 100V, 1W 5096 45V 13-33	3.6V	13 33187 14		
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	135V	13-33179-1		5099
	150V	13-33187-10		5055

Harlan Lippincott, FSDM, Columbus, Ohio.

A12-2 CHASSIS. NO PICTURE, VERTICAL LINE IN CENTER OF CRT.

Foil broken at diode end of terminal 9 of flyback.

B10 CHASSIS. VERTICAL JITTER.

Change neon I300 to No. 30-33062-3 neon lamp.

B10-3 CHASSIS. PICTURE NARROW 3 INCHES ON EACH SIDE.

Check R437 for change of value - should be 18K.

B10-9 CHASSIS. PICTURE GOES NEGATIVE. R248 (7K, 7W) open.

D12 CHASSIS. BURNED RESISTORS IN COLOR DEMOD. CIRCUITS. ALSO 20 VOLT FILTER TRANSISTOR, IF'S, CHROMA, DEMOD. TRANSISTORS SHORTED.

Replace 68K, 2W resistors R690 and R726 before replacing transistors. (B+ gets into 20V line.)

D14, D15, D16 CHASSIS. INTERMITTENT LOSS OF VERT. RED-GREEN CONVERGENCE.

Check C800 for short, located on board (6.8MFD, elec. cap.).

D14, D15, D16 CHASSIS. INTERMITTENT VIDEO AND BRIGHTNESS LEVEL CHANGES.

Check video output transistor by replacement.

D15, D16 CHASSIS. VERY INTERMITTENT LOSS OF COLOR

Replace capacitor C688, 270PF with part no. 40-10285-34.

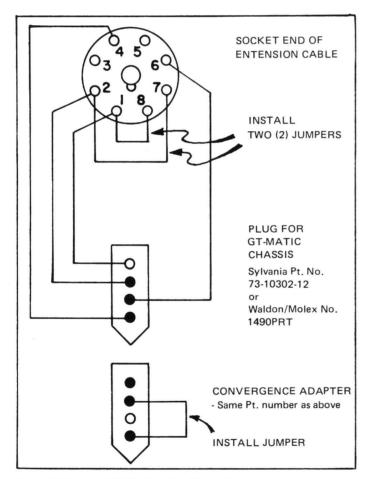
D15, D16 CHASSIS. SOME OF THESE CHASSIS HAVE A RESISTOR IN PARALLEL WITH SCREEN RESISTOR, R444.

Not listed in schematic and parts list. Value is 27K, 3W.

Ray Newhard, FSDM, Walnutport, Pennsylvania.

YOKE ADAPTER EXTENSION FOR GT-MATIC CHASSIS E03/04/05.

For Test Jigs using Sylvania's Yokes Part Numbers 51-15949-3 or 51-29986-2 or equivalent, A PK6 YOKE ADAPTER IS TO BE USED BETWEEN YOKE AND THIS ADAPTER EXTENSION CABLE, The Hi-Voltage on a GT-Matic Chassis will measure approximately 20KV with this adapter connected.



Ennis Williams, FSDM, Omaha, Nebraska.

THE SYLVANIA SERVICE NOTEBOOK is published monthly by the Service Department of the Entertainment Products Group at 700 Ellicott Street, Batavia, New York. It is available to current subscribers for Sylvania Service Literature. Information contained herein is presented as an aid in

WORK AS THOUGH YOU OWNED THE PLACE; YOU DO!

Someone asked a successful man the secret of his success. "I'll tell you," he replied. "It was a small trick I always played on myself. I pretended that I owned the business. No matter where I worked, I pretended I owned the place - lock, stock and barrel."

Isn't it strange? At home we worry if we leave one little basement light on all night or if we waste food or if our property gets run down or if we hire someone who does a sloppy job. But at work we will waste light and power and equipment and material and time and workmanship that costs hundreds of dollars a day and never bat an eye.

Why? Because we have no *Proprietary Interest* in the business. We think of the business as "it", any profit or loss as "theirs." At home if I waste, I am wasting my money. I don't seem to understand that when I waste at the job, I am wasting my time, my job security, my opportunity for advancement, my share of the profits, my future.

Proprietary Interest means that you take the same interest in your company as though you were the proprietor. Well, in a very real sense, you are! It means working at your job as though you had a stake in the business. Well, you do!

We have a slang expression, "Just walk as though you owned the place." What a change we could bring about if every morning we would walk in and go to work as though we owned the place!



servicing radio and television receivers and is furnished without assuming any obligation. Complete engineering data is given in the regular service literature. Correspondence concerning the NOTEBOOK should be sent to the Publications Department at the above address.