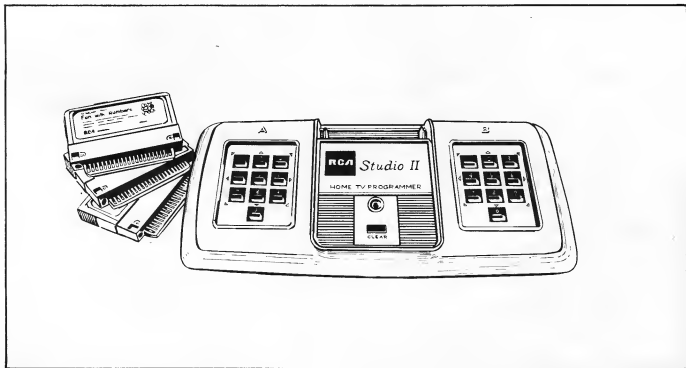


**Service Manual**  
**RCA Model 18V100**  
**Home TV Programmer**

**RCA**



*Studio II*

**Home TV Programmer, Model 18V100**

**Operation • Testing • Disassembly • Parts List**

**RCA Model 18V100 Studio II Service Manual**

## PRODUCT SAFETY NOTICE

Studio II uses an isolated power supply to operate the electronic circuitry. The leakage current to ground of this power unit should be checked at time of game repair. See Page 9 for test procedure.

## TESTER CARTRIDGE AVAILABLE

As an aid to servicing the digital electronics systems of Studio II, a test cartridge is available at nominal cost through

RCA Parts Distributors. Called "Tester I", the cartridge plugs into the slot in the console and checks out the digital circuitry in about 30 seconds. See Page 4 for description and Page 15 for ordering information.

## SERVICE PARTS LIST AVAILABLE

For those organizations planning to service Studio II video games, a kit of Studio II repair parts is available from RCA Parts Distributors. This kit includes all of the parts necessary to service Studio II units in the field. See Page 15 for description and for ordering information.

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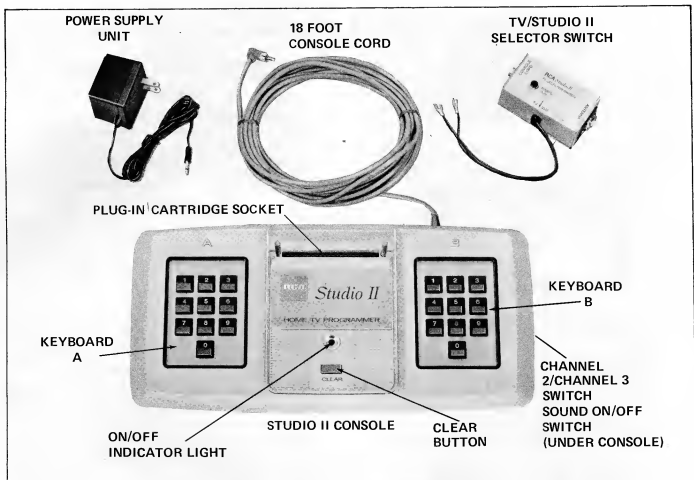


Figure 1. Studio II Major Assemblies

## Description

### GENERAL DESCRIPTION

Studio II is a sophisticated, microprocessor-based system for home entertainment using a broadcast TV receiver as the display device.

Heart of the Studio II is a solid-state, 40-pin integrated circuit microprocessor that functions as a micro-miniature computer. It provides central computer control for a great variety of educational and entertainment programs. Program memory for five built-in games — "Doodles", "Patterns", "Bowling", "Freeway", and "Addition" — is included in the console. A receptacle in the console accepts plug-in program cartridges for many additional games such as "Tennis", "Baseball" and "Blackjack".

### SYSTEM DESCRIPTION

Studio II consists of three major pieces:

**Control Console** — Houses the keyboards and all electronics for program selection and processing. All electronics in the

console (digital, RF oscillator/modulator and audio circuits) are on a single PC board. Signal information from the console is transferred to the Selector Switch Unit through a single coaxial cable. This same cable carries DC power from the Selector Switch Unit to the console to operate the electronics.

**Selector Switch Unit** — Forms the interface between the Control Console, the Studio II Power Supply Unit, the TV receiving antenna and the TV receiver. A two-position switch allows the TV receiver to be connected conveniently to either the Studio II or to the receiver's antenna system. This switch also serves as the game's on/off switch.

**Power Supply Unit** — A sealed, 120 VAC to 9 VDC adapter with a 6-foot (1.8m) cord and plug that connects to a miniature (3mm) phone jack on the Switch Selector Unit. The 9 VDC is coupled to the game's 18-foot (5.5m) coaxial cable through an RF-filtering circuit housed in the Selector Switch Unit.

# Studio II Servicing

The recommended Studio II service procedure is to determine whether the problem is in one of the periphery components, the interconnecting cables or in the console itself. If the PC board in the console is found to be faulty, it must be returned to RCA for repair on an exchange basis. See Page 14.

**IMPORTANT:** No attempt should be made to adjust or repair an inoperative PC board — with the exception of the clock-frequency adjustment described on Page 13.

As an aid to servicing Studio II, a test cartridge (see below) is available from RCA. The cartridge is not essential to service Studio II; however, it does provide a quick and convenient means for isolating malfunctions in the digital systems.

When a Studio II comes in for service, it is important that you have *all three* assemblies: Selector Switch Unit, Power Supply Unit and Console. If the complaint involves one or more plug-in cartridges, these should be included as well.

## SYSTEM CHECKING

Checking Studio II operation can be done quickly and easily using a test cartridge available from RCA (see Page 15 for ordering information). System performance can also be checked by operating each built-in game function; however, this procedure takes more time than the test cartridge check.

## SYSTEM CONNECTIONS

Studio II connects to the 300-ohm VHF antenna terminals of any TV receiver. Figure 2 describes the hookup of the three subassemblies. Figures 4, 5 and 6 describe the hookups with typical video-tape machines and typical cable TV setups.

Recessed on the underside of the console are two slide switches (Fig. 3). One switches the game sound (beeper) on or off while the other changes operating channel. Studio II operates on TV Channel 2 or TV Channel 3 depending on the position of the switch. The switch should be set on the unoccupied channel; or areas where both channels are occupied, on the channel with the weakest broadcast signal. Units are shipped from the factory with the switch in Channel 3 position.

Slide the switch on the Selector Switch Unit (Fig. 7) to "Studio II". This sends power to the console (indicated by the red glow of the pilot light on the console) and connects it to the TV receiver. Studio II is now ready for operation.

## TEST PROCEDURES

Press the "Clear" button on the console and press Key 4 on left-hand Keyboard A (Key A4). This sets Studio II for "Free-way" and the track (Fig. 8) appears immediately. If necessary, adjust the receiver's fine tuning and vertical/horizontal hold controls.

### Operational Checks Test Cartridge (See Page 7 for procedure using built-in programs).

The test cartridge, which plugs into the cartridge slot on the Studio II console, scans the digital circuitry for trouble with a routine that takes about 30 seconds. If it finds a malfunction, the fact

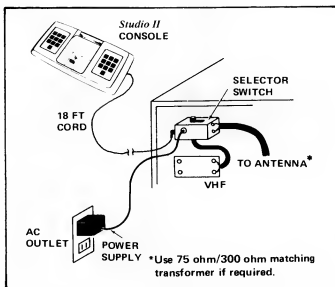


Figure 2. Studio II Connection Diagram

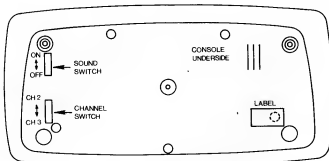


Figure 3. Locations of Channel Change and Sound On/Off Switches

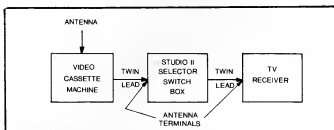


Figure 4. Selector Switch Box Connects Between Video Cassette Recorder and Home Receiver

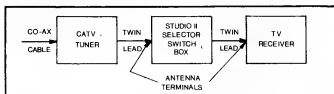


Figure 5. Selector Switch Box Connects Between CATV Tuner and Home Receiver

is indicated on the TV screen; if there is no trouble, the cartridge sets up a test for the two keyboards.

**NOTE:** The Test Cartridge requires substitution of the power unit during test. Use the special 500mA power unit (see Parts List) instead of the original power unit.

1. Press and hold "Clear" button on Studio II console. Insert Tester I cartridge into slot while holding "Clear" button.

**NOTE:** Insert cartridge into console with label side toward "Clear" button. Follow label directions concerning removal of conductive rubber strip covering the plug.

2. Release "Clear" button. A pattern similar to that of Fig. 9a appears on screen immediately, and Tester I begins its scan of the system (indicated by the black streak moving through the white field in the lower half of the pattern). If the pattern fails to appear or a pattern other than that shown appears, a faulty chip is indicated. Replace PC board.

In about 11 seconds, the first scan is complete. The display shifts to the pattern shown in Fig. 9b with a white streak scanning a black field. This scan takes another 11 seconds. At the end of the second scan, the system changes the pattern on the lower half to a series of transient vertical white lines on black and then a series of black lines on white. This sequence takes about 2 seconds. At the end of this short sequence, the pattern again shifts to that illustrated in Fig. 9c. This indicates all memories operational. A digit or digits appearing in the "checkerboard" pattern in the center of the screen, as shown in Fig. 9e, indicates chip failure in the PC board and the board must be replaced.

If the checkerboard appears as in Fig. 9c, touch the keys — one at a time — of Keyboard A, and then Keyboard B. As each key switch closes, the digit on screen should change to a checkerboard square. (If any digit remains on screen after key actuation, the keyboard is defective and must be replaced (see Page 11). When all key closures are complete (indicating

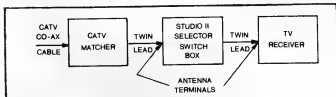


Figure 6. Selector Switch Box Connects Between CATV Cable Matcher and Home Receiver

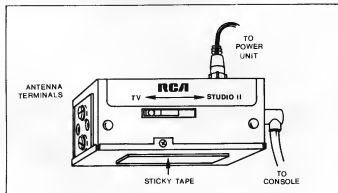


Figure 7. Selector Switch Box

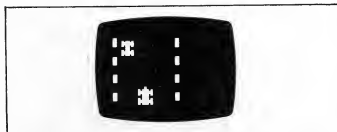


Figure 8. Adjust Receiver for Sharp "Freeway" Display

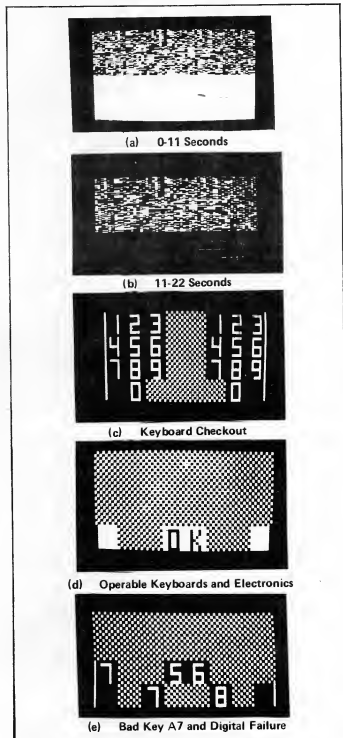


Figure 9. Tester 1 Screen Patterns

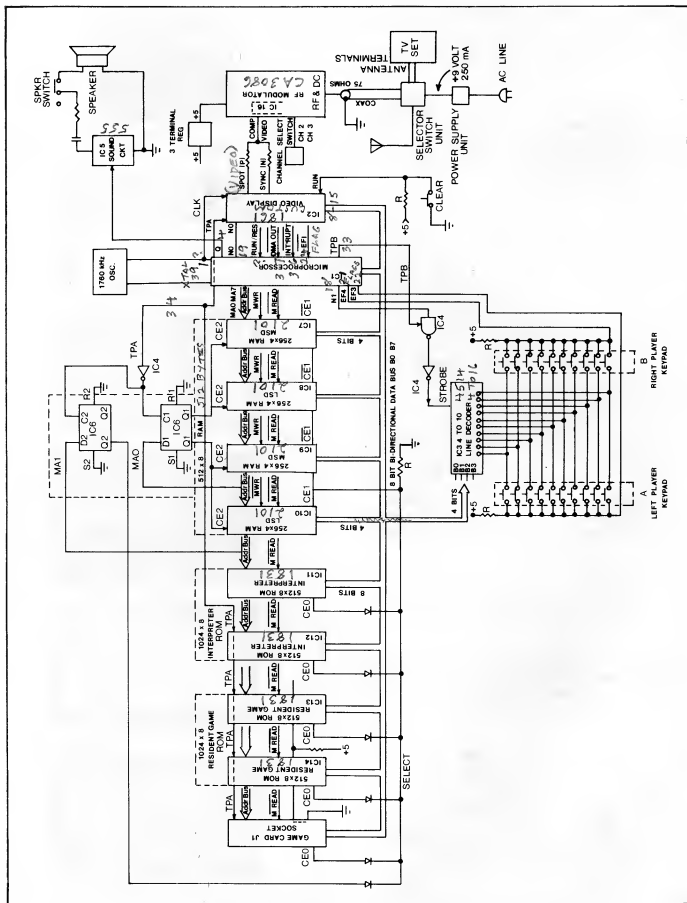


Figure 10. Overall Block Diagram of Studio II System

satisfactory keyboard function), the pattern shifts to the "OK" pattern of Fig. 9d. The pattern flip-flops between black-on-white and white-on-black until the "Clear" button is actuated. If the "Clear" button functions normally, the whole sequence starts again as the button is released. This completes the "Tester 1" test.

**NOTE:** Reconnect the original power unit into the system. Store the special unit with the test cartridge for future use.

#### Operational Checks Using Built-In Programs

The following instructions are for operating the built-in "resident" games to evaluate Studio II performance:

##### "Bowling" Game

Press "Clear" key. Press Key A3 (left-hand keyboard). Screen will display "scorecard" (Fig. 11) for about 3 seconds and immediately sets up alley (Fig. 12) with bowling ball moving up and down at the left side.

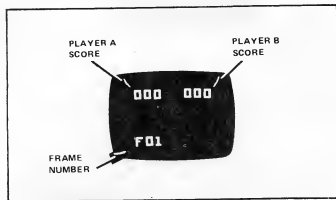


Figure 11. Bowling "Scorecard" Display

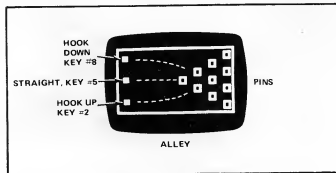


Figure 12. Bowling Ball Release Keys

Keyboard A is in action: Pressing A5 releases a straight ball toward the pins; Key A2 sends a ball with a left (upward) hook while Key A8 delivers a right (downward) hook (Fig. 12). Knocking out all pins on one throw registers a strike with a score of 20 ("ST-20" at lower left corner of alley); two throws, a score of 15 ("SP-15" on screen). The scorecard reappears for about 3 seconds after the second ball is thrown or all pins are downed. Player 2 then plays right-hand Keyboard B.

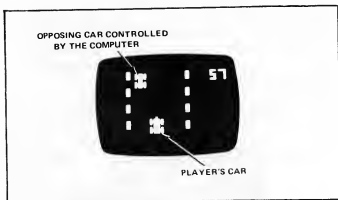


Figure 13. "Freeway" Screen Display

##### "Freeway" Game

Press "Clear" key. Press Key A4; racetrack appears on screen (Fig. 13). Press Key B0 to start race. Press and hold Key B4 to steer car to left; Key B6 steers car to right. Press A2 to speed up race (throttle); Key A8 slows car (brake). Object: Accumulate "mileage" by avoiding collisions with computer-controlled (narrow-bodied) car in a two-minute race. At the end of the race, the screen displays the distance traveled.

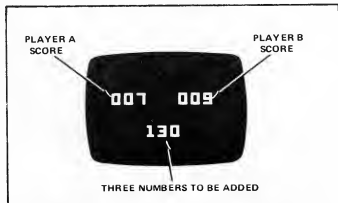


Figure 14. "Addition" Screen Display

##### "Addition" Function

Press "Clear" key. Press Key A5. Screen display appears as shown in Fig. 14. Player has five seconds to add the three digits in the lower group and press the correct answer on Keyboard A or B. For example, the "130" on Fig. 14 adds up to "4". Punch A3 or B3 to score. The sooner the correct total is entered, the higher the score. (Maximum score for each entry is 11). If the wrong total is entered, the keyboard "locks out" and the player gets no second chance on the on-screen combination. There are 20 sets in the run in random order.

##### "Patterns" Function

Press "Clear" key. Press Key A2. Screen remains dark. Press Key B4, then Key B0. The computer then "paints" the screen white from right to left and from bottom to top. Once the matrix is all white, the computer then paints the screen black. Press Key B5, the painting stops or freezes, press Key B0, painting resumes.

The keys of Keyboard B "write" on the screen according to the white arrowheads on the keyboard (Fig. 15). To form an interesting pattern, press "Clear" key, then A2, B2 15 times, B6 once, and then B0. The memory stores up to 130 key entries or "moves". After 130 moves, the computer automatically starts to repeat the pattern. For 129 or fewer moves, Key B0 must be pressed to start the repeat cycle.

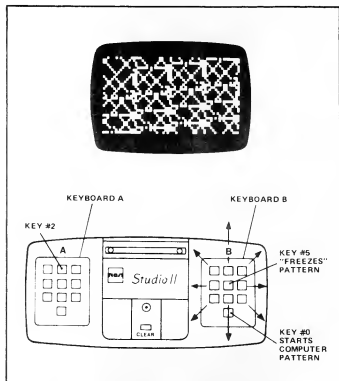


Figure 15. Keyboard "B" Moves Spot According to White Arrowheads on Panel

#### "Doodles" Function

Press "Clear" key. Press A1. Single dot appears on screen at lower left corner. Use keys on Keyboard B to move spot according to white arrows on panel (Fig. 16). Key B5 leaves a trail as player "writes" with Keyboard B. Pressing Key B0 leaves no trail. Retrace steps to erase lines already written.

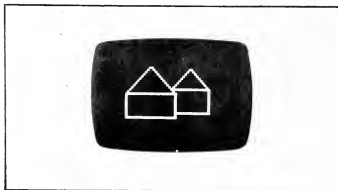


Figure 16. In "Doodles", etch a sketch electronically with the "B" keyboard

#### Keyboard Tests

If "Tester I" cartridge is available, use it to isolate keyboard malfunction. If Tester I is unavailable, the keyboards can be tested using the built-in "Addition" game:

Step 1: Punch up "Addition" game (Key A5). Sound switch must be "on".

Step 2: When the three-digit number appears on screen, enter a series of wrong answers, beginning with A1. As each button is pressed, the beeper sounds, indicating the particular button is operational. The beeper sounds *only* during the five seconds that the random-order display is on screen. Usually, the entire keyboard can be checked during the five-second display. If any key fails to sound, that key is faulty and the entire keyboard should be replaced.

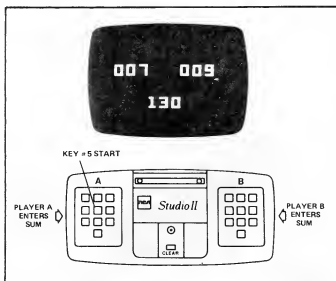


Figure 17. Using "Addition" to Check Keyboards

#### "Double-Hit" Keyboard Complaints

Some early production units (Serial Nos. 37125 and lower) occasionally exhibit a keyboard malfunction termed "double-hit" when Studio II operates in the "Patterns" mode (unwanted dots appear on the screen, and the beeper sounds twice for only one key entry). The only remedy for double hits is keyboard replacement.

#### Coaxial Cable Tests

The coaxial cable carries modulated RF from the console and DC from the power unit. Use an ohmmeter to test the cable from the plug end (Fig. 18). A good cable measures 5 to

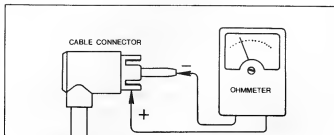


Figure 18. Checking Continuity of Co-ax Cable



50 ohms resistance with *negative* ohmmeter polarity on the *center* conductor. (With positive polarity on center conductor, resistance should be between 20 and 30k ohms.) See "Coaxial Cable Replacement".

### Selector Switch Unit Tests

The quickest test for a troublesome Selector Switch Unit is substitution with a new unit (see Parts List). If a new unit is unavailable, use a DC voltmeter and ohmmeter to check unit circuitry (see schematic of Fig. 19) for open or short-circuited components.

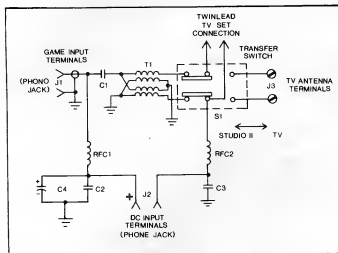


Figure 19. Schematic, Selector Switch Unit

When the switch is in the "Studio II" position, it connects the coaxial cable from the console to the twin lead and completes the DC circuit between the console and power supply. With the switch in the "TV" position, it disconnects the console and forms a circuit between the antenna terminals and the twin lead for normal TV reception.

If the Selector Switch Unit is defective, it must be replaced (see Parts List) since it cannot be satisfactorily repaired in the field. It is carefully manufactured so as not to exceed the RF radiation limits specified by the FCC.

If snowy pictures occur in the "TV" position or Studio II cannot be shut off, check antenna connections for short circuits

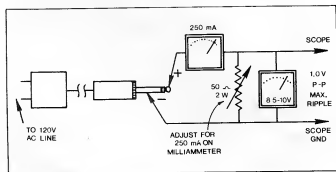


Figure 20. Testing Power Unit Output for Voltage and Ripple Content

to the metal box or rivets holding terminal board. If either antenna lead touches the box or rivets, snowy pictures may result. (Late production units use insulated rivets which eliminate problem)

### Power Supply Unit Tests

The Power Supply Unit operates between carefully chosen voltage and ripple limits. To check unit for satisfactory operation, connect unit as shown in Fig. 20. DC output under these conditions ranges between 8.5 and 10V. Ripple on this DC (measured with oscilloscope) must not exceed 1V peak-to-peak. Replace unit if beyond these specifications (see Parts List).

### Leakage Current Test

With the Power Supply Unit plugged into an AC outlet, check for leakage current to earth ground on *both* poles of the phone plug, as shown in Fig. 21, using an AC milliammeter. Leakage current *must not* exceed 0.5mA. Reverse AC plug polarity and recheck leakage current.

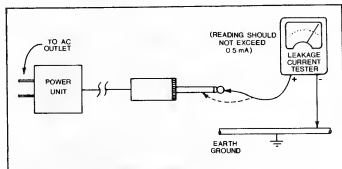


Figure 21. AC Leakage Test

**NOTE:** If power unit checks out OK but is inoperative with operable Studio II console, check fit of plug-in jack. Some early production plugs and jacks have tolerances that conflict and prevent adequate plug penetration. Solution to problem is often simply to increase effective length of plug by filing the jack slightly as shown in Fig. 22. (Use sharp knife to remove any untrimmed mold flash from jack if present.)

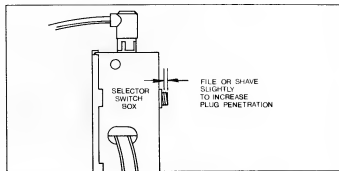


Figure 22. Removal of Material from Front Edge of Jack

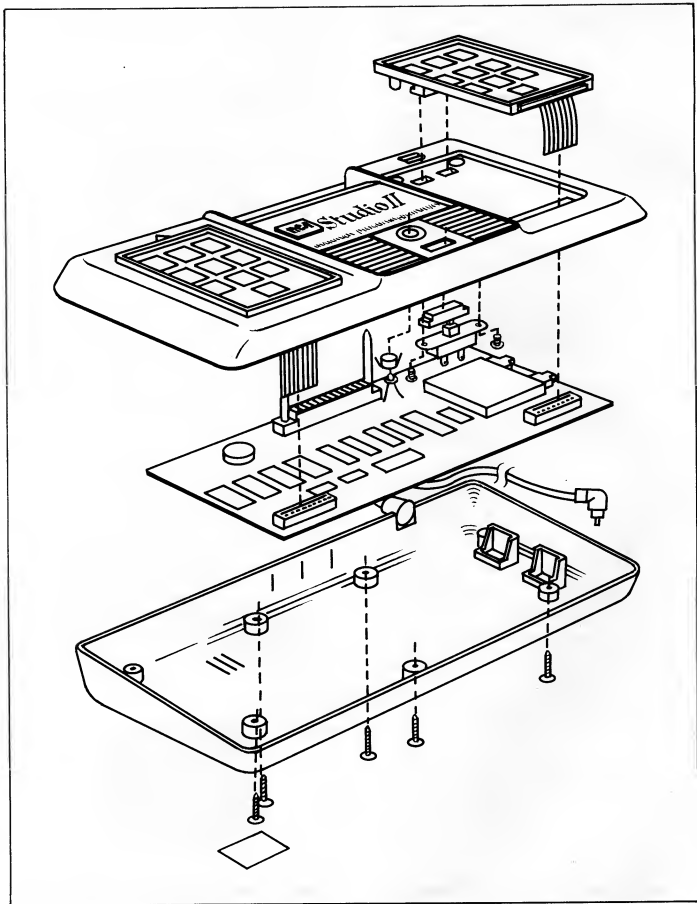


Figure 23. Studio II Console Assembly

## CONSOLE DISASSEMBLY

The console consists of six separate subassemblies: the two halves of the cabinet, printed circuit board, two keyboards, and a "Clear" switch/power-on indicator.

The upper and lower halves of the cabinet are separated by removing 5 Phillips-head screws. With the bottom cover removed, the underside of the printed circuit board is exposed. Lift the PC board up at the cartridge socket side as shown in Fig. 24. This exposes the component side of the board. The board stands on edge if set between pillar (near "Clear" switch) and flange of cabinet upper half as shown.

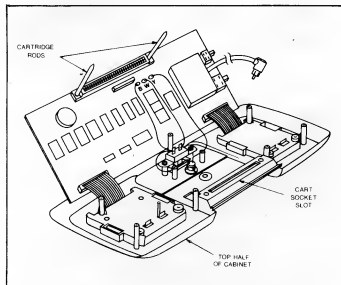


Figure 24. PC Board in Wiring Access Position

**NOTE:** The channel-change and sound on/off switches, plug-in cartridge connector and other components mounted on the PC board are not field replaceable. All PC board faults (except speaker) require board exchange.

**CAUTION:** Tuner sprays containing silicon must not be used on slide switches. Irreparable switch damage will result.

## COMPONENT REPLACEMENT PROCEDURE

### PC Board Removal

Disconnect black, white and yellow wires from board; unsolder coaxial cable from board and carefully pull out keyboard ribbon leads from RC board connectors. See "PC Board Packing and Shipment" for board exchange details (Page 14).

### Keyboard Replacement

1. Keyboard replacement requires console disassembly as described above.
2. Unplug the ribbon cable of the defective keyboard from the ribbon connector on the PC board by pulling the ribbon straight out of the connector.

3. Release the keyboard from the console by unlatching two brown colored latches as illustrated. Keyboard is now free of console.

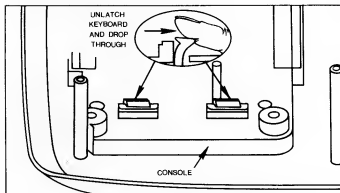


Figure 25. Releasing Keyboard from Console

4. Install new keyboard by feeding ribbon cable through opening in console *before* latching keyboard in place.
5. Push ribbon cable into connector.

**NOTE:** Some Studio II units use unenclosed ribbon connectors on PC board. Ribbon cable *must* center in the connector so that all 11 leads contact for proper operation.

6. If ribbon cable from keyboard fails to make good contact in connector, trim back 1/16 inch from edge with ordinary household scissors to expose fresh contact.

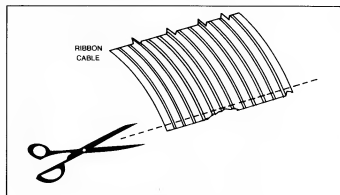


Figure 26. Trim Ribbon Cable with Scissors to Repair Damaged Edge

### Coaxial Cable Replacement

1. Remove bottom half of console cabinet. Pry off metal shield covering end of coaxial cable.

**CAUTION:** Pry carefully so as not to damage foil wiring on PC board.

2. Disconnect cable by unsoldering *shield first*. Do not overheat foil.
3. Install replacement cable as shown by soldering center lead first.
4. Re-install shield cover carefully and firmly. Center coaxial

cable in slot in cover (Fig. 27). Shield *must* be fully seated to minimize radiation of modulated carrier.

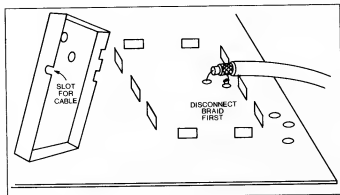


Figure 27. Disconnect Co-Ax Shield First to Replace Cable. Resolder Center Lead First on Installation. Do Not Overheat Foil in Board.

#### LED Indicator Replacement

**NOTE:** Installing a new LED in the console requires the use of a special tool that can be fabricated from a piece of sheet metal with a sabre saw. See Fig. 28 for dimensions.

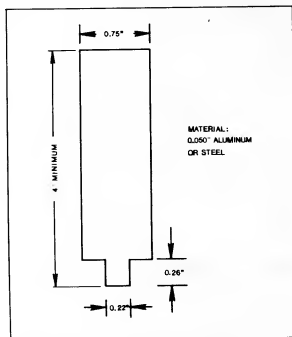


Figure 28. LED Replacement Tool

1. Unsolder the black and white leadwires from "Clear" switch terminals and unsolder the yellow wire from the LED pigtail. This frees the console top half for LED replacement.
2. Snip both LED pigtails off close to the LED.
3. Place console cover, face up, on block and drive out old LED with small screwdriver or 1/8-inch drift pin.

4. From underside of cover, bend clipped pigtails back and collapse black plastic holder with needlenose pliers or diagonal cutters. Remove holder from console holes using pliers or cutter.

5. Install new LED holder. Press holder gently into hole in console cover until it clicks into place (Fig. 29).

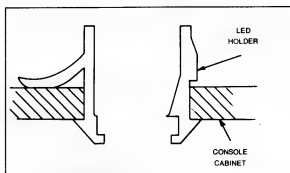


Figure 29. Cross-Sectional View of Seated LED Holder in Console Cabinet

6. Place new LED in LED holder with *shorter* (cathode) pigtail toward side connected to "Clear" switch (see Fig. 30 and 31). This is important — indicator cannot light if con-

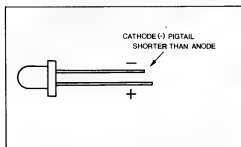


Figure 30. Polarity Marking on LED

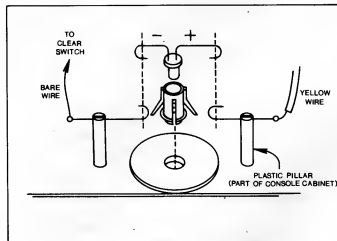


Figure 31. Indicator Assembly

nected with reversed polarity. Use fabricated tool (Fig. 28) to push LED into holder. LED "clicks" into place. Any tool without a shoulder usually pushes LED out of the holder.

7. Form snipped leadwires as shown in Fig. 31 and connect new LED pigtails to them. Solder quickly to prevent overheating LED.

8. Reconnect black, white and yellow leads from PC board to complete installation.

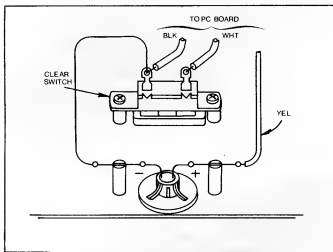


Figure 32. Power-On Indicator Wiring

#### CLOCK FREQUENCY ADJUSTMENT PROCEDURE

Incorrect clock frequency adjustment causes pattern weave on screen. This results from a beat note between the vertical sync rate of Studio II and the hum frequency in the TV receiver. If the beat note is more than 0.5 Hz, the weave becomes noticeable to the critical user. Clock frequency is a slug adjustment on the PC board.

1. Connect scope probe to the junction of two resistors as shown in Fig. 34. Connect scope ground to RF shield, cartridge post or to other suitable board ground.

2. Adjust scope time base for a total sweep length of 20 milliseconds or more (sync on "Line") and vertical input sensitivity for about 250 mV/cm (0.625 V/in).

3. Push "Clear" button on console and adjust slug slowly for zero waveform drift. See Fig. 33. Guard against overadjustment.

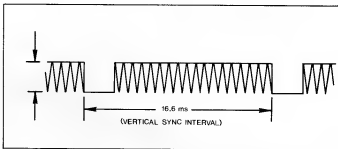


Figure 33. Waveform Used to Adjust Clock Frequency. Scope Time-Base Locked to 60Hz Power Line

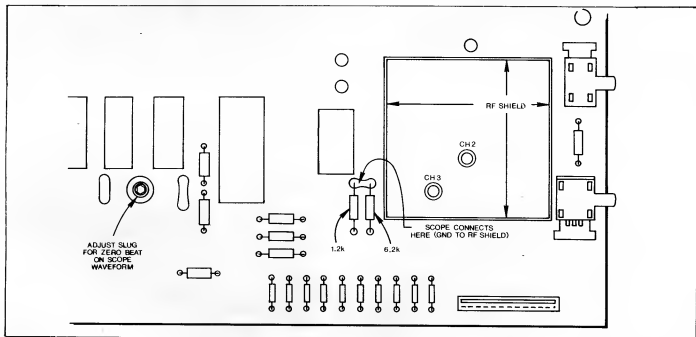


Figure 34. Scope Connections for Adjusting Clock Frequency

# PC Board Exchange

## EXCHANGE PLAN DESCRIPTION

RCA operates a PC board refurbishing facility at Swannanoa, North Carolina. Defective PC boards sent to this facility are refurbished and returned to the sender at a cost of \$15.00\* provided, of course, the exchange board is repairable.

## PC BOARD PACKING AND SHIPMENT

**NOTE:** If custom shipping container described below is not available, pack PC board in cushion of crumpled newspapers or "bubble pack" in suitably sized carton. Make sure board is *completely surrounded* with cushion to prevent shipping damage that might make board useless for exchange. Be sure to include a completed questionnaire (from Page 15) in the package.

1. Pack defective PC board in foam shipping container as shown. Note relative positions of PC board components and

the molded-in supports in the foam plastic. If two halves of foam packing fail to mate easily, reverse relative position of one to another.

2. Pack foam enclosure in carton. Use crumpled newspapers as cushion around foam enclosure.

3. Fill in all blanks on questionnaire, particularly those indicating abnormal symptoms (questionnaire packed with refurbished board). Pack completed questionnaire on outside of upper corrugated filler as shown and pack in carton.

4. Include check or money order for \$15.00\*. A refurbished PC board will be shipped to the address you supply on the questionnaire packed with defective board.

5. Ship *prepaid* (Parcel Post or UPS) to:

Studio II PC Board Refurb. Dept.  
RCA Distributor & Special Products Div.  
Old Bee Tree Road  
Swannanoa, North Carolina 28778

\*Price subject to change without notice.

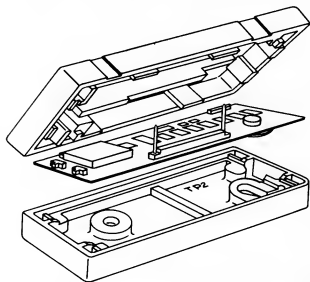


Figure 35. Packing PC Board in Foam Container

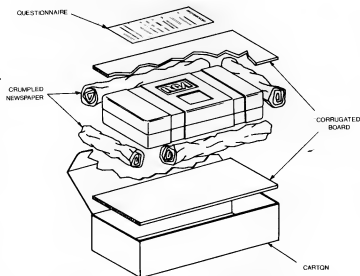


Figure 36. Packing Foam PC Board Container in Carton

## Studio II Service Parts Kit

Service organizations desiring to stock service replacement parts may order a kit of Studio II replacement parts and assemblies through RCA Parts Distributors as Stock No.

199047. Cost for the entire kit is \$99.95\* — as compared with a total of \$122.90\* for the 20 individual pieces. The kit includes:

Quantity	Description	Stock No.	Quantity	Description	Stock No.
2	PC Board (less coaxial cable)	742463 <sup>1</sup>	2	Speaker	742448
2	Coaxial Cable Assembly	742421	2	LED Power Indicator (Incl. Holders)	742461
1	Selector Switch Assembly	18V102	3	"Clear" Switch	742459
1	Power Supply Unit	18V101	3	Pushbutton for "Clear" Switch	742460
3	Keyboard Assembly	742458	1	Set of 4 Console Rubber Feet	742462

<sup>1</sup> Includes reusable shipping carton for each board

\*Price subject to change without notice.

### STUDIO II PC BOARD EXCHANGE QUESTIONNAIRE

Please pack completed questionnaire in container with defective board with check or money order for \$15.  
(Price subject to change without notice.) Studio II Serial No. \_\_\_\_\_

Please describe defect symptom(s). (No display,  
partial display, no sound, etc.)

#### RETURN SHIPPING LABEL

Firm Name \_\_\_\_\_

Firm Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_ Zip \_\_\_\_\_

Attn: \_\_\_\_\_

Defect: Intermittent  Continuous

Note: For in-warranty board exchange, include  
RCA Form PA737 "Repair Report".

CUT ALONG THIS LINE

### STUDIO II PC BOARD EXCHANGE QUESTIONNAIRE

Please pack completed questionnaire in container with defective board with check or money order for \$15.  
(Price subject to change without notice.) Studio II Serial No. \_\_\_\_\_

Please describe defect symptom(s). (No display,  
partial display, no sound, etc.)

#### RETURN SHIPPING LABEL

Firm Name \_\_\_\_\_

Firm Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_ Zip \_\_\_\_\_

Attn: \_\_\_\_\_

Defect: Intermittent  Continuous

Note: For in-warranty board exchange, include  
RCA Form PA737 "Repair Report".

CUT ALONG THIS LINE

## Replacement Parts and Accessories

Description	Stock No.	Description	Stock No.
PC Board (less coaxial cable, packed in reusable shipping carton)	742463	Pushbutton for "Clear" Switch	742460
Cable Assembly	742421	Rubber Feet (Package of 4)	742462
Power Unit Assembly (incl. cord and plug)	18V101	"Tester I" Test Cartridge <sup>2</sup>	5009339
Selector Switch Assembly	18V102	Power Unit (for use with "Tester I")	5008333
Keyboard Assembly	742458	Console Housing, Upper Half (Dwg. No. 1809952)	
Speaker, 2.24-inch diameter	742448	Console Housing, Lower Half (Dwg. No. 1809951)	
LED Indicator (incl. plastic holder)	742461	Dress Plate (LED Indicator and "Clear" button)	
"Clear" Switch	742459	Dress Plate ("Studio II") (Dwg. No. 1808321-1)	
		Dress Plate ("Studio II") (Dwg. No. 1808319-1)	

<sup>2</sup> Requires special power unit Stock No. 5008333





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