

INSTALLATION AND OPERATING INSTRUCTIONS

COPY

**CONRAC**

TELEVISION MONITOR

TYPE CF17-CF21

**CONRAC, Inc.**

GLENDORA, CALIFORNIA

## TECHNICAL SUMMARY

### INPUT

POWER: 117 Volts      60 Cycle      200 Watts  
Fusing: 3 Ampere Primary Fuse (Extractor Post Type)

VIDEO SIGNAL REQUIRED: .35 Volt peak (minimum for 50 volts at kinescope grid); sync negative

### VIDEO INPUT IMPEDANCE:

1. High impedance for bridging -- approximately 270,000 ohm in parallel with 15 mmfd
2. 75 Ohms terminating resistance, with switch on rear apron.

VIDEO FREQUENCY RESPONSE: Flat  $\pm$  1 DB to 6 MC; down 6 DB at 7.5 MC.

*V301  
12A07 5814*

### TUBE COMPLEMENT

(Furnished with Monitor)

<u>Symbol</u>	<u>Type</u>	<u>Function</u>
V1	6AU6	1st Video Amplifier
V2	6AU6	2nd Video Amplifier
V3	6CL6	3rd Video Amplifier
V402	6BY6	Sync Stripper
V403	6SN7GT	DC Restorer and Sync Phase Inverter
V404	6AL5	Horizontal Phase Detector
V601	6SN7GT	Horizontal Oscillator
V602	6CD6G	Horizontal Amplifier
V603	6AU4	Horizontal Damper
V604	1B3GT	High Voltage Rectifier
V501	6SN7GT	Vertical Oscillator
V502	6W6GT	Vertical Output Amplifier
V301	5U4GB	Low Voltage Rectifier
V4	17BP4B or 21AWP4	Kinescope

### MECHANICAL SPECIFICATIONS

	<u>CF17N</u> <u>Chassis Only</u>	<u>CF 17R</u> <u>Rack Mounting</u>	<u>CF 17C</u> <u>Utility Cabinet</u>
Width	16 5/8"	19"	18 1/2" (over handles)
Height	16 3/8"	17 1/2"	17 3/4"
Depth	20 1/2"	20 1/2"	20 1/2"

	<u>CF 21N</u>
Width	21"
Height	20 1/4"
Depth	23 3/8"

## DESCRIPTION

The CF 17 Monitor is a complete self contained 17" picture monitor which may be operated from a line containing composite video and sync. It is available as a chassis, or mounted in either a steel utility housing or a standard 19" Rack Hanger. The CF 21 Monitor is available as a chassis only. It is a complete package, with a type 21AWP4 picture tube mounted on the chassis.

## UNPACKING

As soon as the Monitor is received, it should be unpacked and examined for damage which may have occurred in shipment. Similarly, the picture tube should also be unpacked and examined for cracked glass, etc. Should any damage be found, file a claim with the carrier immediately, stating the extent of the damage.

## INSTALLATION

The Monitor is shipped with all tubes installed except the Kinescope. To install the Kinescope, remove the monitor chassis from the housing (CF17C only) by removing the two  $\frac{1}{4}$ " x 20 knurled head screws from the bottom corners of the front, and the two  $\frac{1}{4}$ " x 20 round head machine screws holding the rear lip of the chassis down in the housing. On CF17R units, two  $\frac{1}{4}$ " x 20 round head screws must be removed from beneath the housing and discarded, these having been placed there for shipping purposes only.

Unpack the Kinescope, using extreme care not to scratch the tube or to subject it to more than moderate pressures. Place the tube in position on the chassis, using caution not to damage the yoke windings as the prongs of the tubes are passed through the yoke. The Anode Connector must be on your left as you face the tube.

Place the tie down strap in position over the front of the Kinescope, passing the ends through the holes in the chassis just outside each end of the hardwood cradle. Place a #10 lockwasher and a #10-32 nut on each end of the strap. Tighten the nuts MODERATELY. On 21" mounts, the strap ends are passed through the holes in the tie down bracket beneath the blocks.

Plug the Anode Connector into the receptacle on the side of the Kinescope.

Place the Ion Trap on the neck of the Kinescope, about  $\frac{1}{2}$ " forward of the base of the Kinescope, with the red mark opposite pin #2. Place the Kinescope Socket on the tube. Plug line cord into a 117 volt, 60 cycle supply, and turn Monitor ON. As soon as the tubes have had time to heat, turn the Brightness control to its maximum, and adjust the Ion Trap for maximum light on the screen. Restore brightness control to normal.

#### INITIAL ADJUSTMENTS

Plug a source of composite video into the INPUT jack, J1 or J2. The line may be terminated by switching S1 to 75 Ohms. It should now be possible to see a picture on the screen.

#### CENTERING - REAR ADJUSTMENTS

Using a standard test pattern, set the Height and Vertical Linearity so that the top and bottom halves of the picture are similar. Loosen the locking lever associated with the centering adjustment found at the top of the focus coil mounting plate. Center the picture by repositioning the centering adjustment. Tighten the locking lever and readjust the Ion Trap.

#### CIRCUIT DESCRIPTION

##### VIDEO

Two input jacks, J1 and J2, are wired in parallel to facilitate multiple connection of monitors. A switch (S2) is provided on the rear apron to terminate these plugs with a 75 Ohm non-inductive resistor, wired inside the chassis. The first and second Video stages employ type 6AU6 tubes with shunt peaking. The third Video stage employs a type 6CL6 tube with series-shunt peaking, and drives the kinescope cathode. All video peaking coils are adjustable. V403A, ( $\frac{1}{2}$ -6SN7), is diode connected as a DC restorer.

##### VERTICAL

The vertical scanning generator consists of V501 (6SN7) connected as a multi-vibrator. The vertical output amplifier is a 6W6 GT triode connected. Linearity is adjusted by a rheostat in the cathode circuit.

##### FOCUS

Focus adjustment is made by turning the knurled (and slotted) knob found just above the neck of the picture tube, to the rear of the focus magnet.

## DRIVE

Reduce the Horizontal Drive by turning the control counter clockwise until the picture becomes quite narrow and somewhat dim. Set the horizontal hold for normal synchronization. Increase the drive by turning the drive control clockwise until either (1) the picture falls out of synchronization, or (2) a "drive bar" (a vertical bright bar near the center of the screen) appears. In either case, reduce the drive until the condition disappears.

## WIDTH

Turn the width control counter clockwise to nearly the end of its range for operation with both sides of the picture showing. Turn the control clockwise to nearly the end of its range for operation with the picture filling the screen. The control may be left in any desired position between these extremes as a final adjustment.

## HORIZONTAL FREQUENCY

Set the horizontal hold potentiometer, R605, in the center of its range. Temporarily ground pin #1 (grid) of V403B, sync phase inverter, with a screw driver or suitable tool. Adjust the ringing coil, L603, until the pattern on the screen is upright and nearly stationary. This should give optimum operation. Other adjustments are possible for special operating conditions: Should it be desirable to increase the stability of the Horizontal Oscillator and decrease its "pulling in" range, temporarily ground pin #1 of V5 as above, set the horizontal hold control near its maximum resistance end (with pattern leaning toward 10 o'clock), and adjust the ringing coil until the picture is nearly synchronized as above. Similarly, if the hold control is set near the minimum resistance end and the above adjustments made, greater pull-in range and less horizontal stability will result.

## NOTES ON MAINTAINANCE AND REPAIR

### POOR VERTICAL LINEARITY

Replace the type 6W6 GT tube, trying several tubes from several batches, if necessary.

### VERTICAL LINES IN PICTURE NOT STRAIGHT

Ascertain that the horizontal drive is properly adjusted, and not turned too far clockwise. Readjust the Horizontal Frequency as outlined above.

## HORIZONTAL

From V403B, negative and positive sync pulses are supplied to pin #1 and pin #2 respectively of the horizontal phase detector, V404 (6AL5). Pins 5 and 7 are fed a sawtooth comparison voltage from the isolation transformer T602, which is excited by the current through the horizontal deflection (yoke) coils. The output from the phase detector is fed through an integrating network to the grid (pin #1) of the Horizontal Oscillator tube, V7. With the system in proper adjustment, the output of the phase detector is very nearly zero. If for any reason the Horizontal Oscillator starts to drift out of sync, the phase detector develops a voltage of proper polarity to restore the Oscillator to synchronism.

The Horizontal Oscillator, V7, is a variation of the "Potter" multivibrator, stabilized by a resonant tank circuit. The tank circuit, L603 and C601, is tuned to a frequency slightly below the line scanning frequency (15.75 kc). It should be noted that if the coil is tuned to too high a frequency, the Oscillator may jump abruptly to one-half its normal frequency, synchronizing on every other cycle of the ringing circuit.

A type 6CD6C tube is used as the horizontal output amplifier. It is partially grid leak biased, but has a large cathode resistor which will protect the system in the event of failure of the horizontal drive circuit. A high efficiency auto-transformer type deflection system is used, the Kinescope ultor voltage being derived from the "flyback" pulse. Series resistors, R616 and R621 are provided to assist in filtering the ultor voltage and to reduce shock hazard by limiting the available current to less than 4 milliamperes.

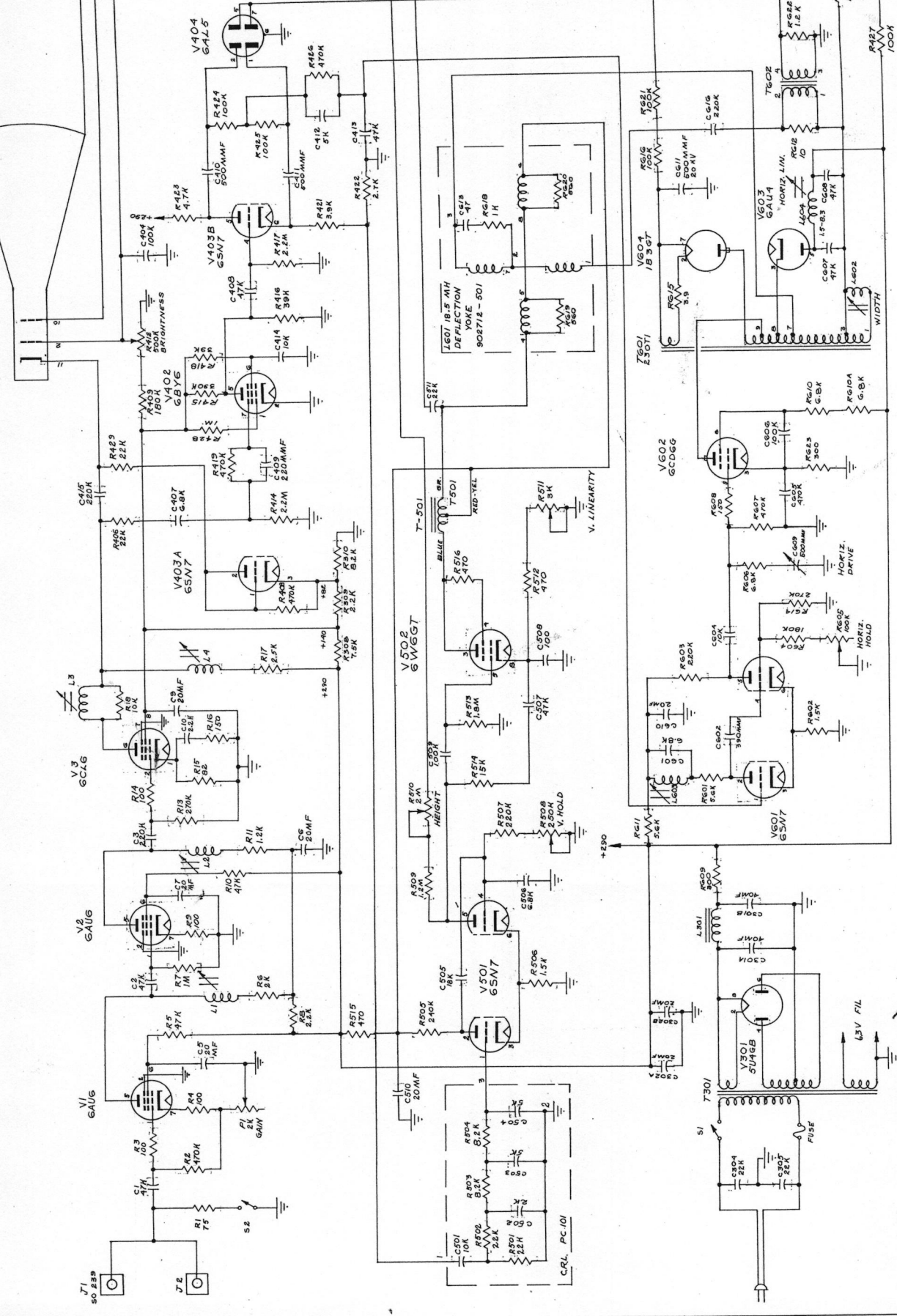
## POWER SUPPLY

A full wave rectifier system employing a type 5U4GB tube with a condenser input filter is used.

## HORIZONTAL ADJUSTMENTS

### LINEARITY

Connect the positive terminal of a D. C. voltmeter to the cathode of the Horizontal Oscillator, V8 (6CD6), using a 50 volt scale, negative terminal grounded. Adjust the Horizontal Linearity control until the voltage is at a minimum; then turn the control counter clockwise one-half to two turns, to find the position of best linearity.



ELYACIK STANCOE A-8265/HO-215  
 YONG STANCOE DY-11A 70°

CONRAC Inc.		DESCRIPTION	
DATE	11/80	TYPE	SCHEMATIC TYPE OF VIDEO MONITOR
REVISED BY		REVISION	1180
MATERIALS			
FIGURE			

## DESCRIPTION

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##### FOCUS

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DC VOLTAGE TABLE

Measured from tube sockets to chassis with RCA Volttohymst  
Normal picture, Line Voltage 117 volts 60 cycle

PIN NUMBER	1	2	3	4	5	6	7	8	9	10	11
V-1 6AU6	3	G	G	F	237	140	4.2				
V-2 6AU6	0	G	G	F	240	110	1.1				
V-3 6CL6	2.35	0	125	F	G	180	0	125	0		
V-4 6BY6	.1	G	G	F	11	16	-8.5				
V403 6SN7	78	78	85	0	260	13	F	G			
V601 6SN7	.3	215	8.5	-6	100	8.5	F	G			
V501 6SN7	0	50	2.05	-14	70	2.05	F	G			
V502 6W6	-	F	340	340	0	TP	G	44			
V602 6CD6	-	G	25V	-	-.6	-	F	135			
V603 6AU4					270						
V301 5U4GB		F-370		322AC		322AC		F			
Kine	F	26.5							460	74	F

DC VOLTAGE TABLE

Measured from tube sockets to chassis with RCA Volttohymst  
Normal picture, Line Voltage 117 volts 60 cycle

PIN NUMBER	1	2	3	4	5	6	7	8	9	10	11
V-1 6AU6	3	G	G	F	237	140	4.2				
V-2 6AU6	0	G	G	F	240	110	1.1				
V-3 6CL6	2.35	0	125	F	G	180	0	125	0		
V-4 6BY6	.1	G	G	F	11	16	-8.5				
V403 6SN7	78	78	85	0	260	13	F	G			
V601 6SN7	.3	215	8.5	-6	100	8.5	F	G			
V501 6SN7	0	50	2.05	-14	70	2.05	F	G			
V502 6W6	-	F	340	340	0	TP	G	44			
V602 6CD6	-	G	25V	-	-.6	-	F	135			
V603 6AU4					270						
V301 5U4GB		F-370		322AC		322AC		F			
Kine	F	26.5							460	74	F

CONRAC MONITOR, CF17-CF21

PARTS LIST

<u>Symbol</u>	<u>Description</u>	<u>Symbol</u>	<u>Description</u>
<u>RESISTORS</u>		<u>POTENTIOMETERS</u>	
R-615	3.9 ohm	R511	3000 ohm (Vert. Lin.) #869
R-612	10 ohm	R412	500K (Brightness) #863
R-15	82 ohm	R605	100K ohm (Horiz. Hold) #884
R-4,R3,R9,		R508	250K ohm (Vert. Hold) #883
R-14	100 ohm	R510	2 Megohm (Height) #886
R1	75 ohm 5%	P1	2 K Contrast Control
R608,R16	150 ohm		
R609	300 ohm 10 watt	<u>VACUUM TUBES</u>	
R623	300 ohm 10 watt	V404	6AL5
R516	470 ohm	V602	6CD6G
R512,R515	470 ohm 1 watt	V1,V2	6AU6
R619,R620	560 ohm	V3	6CL6
R618	1000 ohm	V301	5U4GB
R622	1200 ohms	V501,V601	6SN7GT
R-11	1200 ohm 2W	V403	
R602,R506	1500 ohm 5%	V502	6W6GT
R-6	2K 2W 5%	V603	6AU4
R-8,R309	2.2K 2W	V604	1B3GT
R422	2700 ohm	V402	6BY6
R17	2500 ohm 10W		
R421	3900 ohm	<u>CAPACITORS</u>	
R423	4700 ohm	C613	47 mmfd 5% 1000 V Mica
R606	6800 ohm	C409	220 mmfd 20% Mica
R601	5600 ohm 5%	C602	390 mmfd 5% Mica
R611	5600 ohm 1 watt	C410,C411	500 mmfd 10% Mica
R308	7500 ohm 10 watt	C611	500 mmfd 20KV
R310	8200 ohm 2 watt	C609	100 to 500 mmfd Variable
R18	10K	C10	2.2K 10% 600V
R610,R610A	6.8K ohm 10% 2 watt	C412	5000 mmfd Ceramic Disc., 500V
R514	15K ohm	C506,C407	6800 mmfd 600V
R406,R429	22K ohm	C601	6800 mmfd 500V Mica 10% zero temp.
R418,R416	39K ohm	C505	18K 600V
R5,R10	47K 1W	C604	10K 600V
R616,R621	100K ohm 1 watt	C414	10K Ceramic Disc.
R410,R424	100K ohm	C511,C304	22K mmfd 600V
R425		C305,C612	
R507,R409	221K ohm	C408,C1,C2	47K mmfd 600V
R603		C3,C413	
R604	180K ohm	C507,C607	
R505	240K ohm 1 watt 5%	C608	
R614,R13	270K	C404,C606	100K mmfd 600V
R415	390K ohm	C509	
R2,R408	470K ohm		
R426,R607			
R419			
R428,R7	1 Megohm		
R509	1.2 Megohm		
R513	1.8 Megohm		
R414,R417	2.2 Megohm		

CONRAC MONITOR, CF17-CF21

PARTS LIST (Cont'd)

<u>Symbol</u>	<u>Description</u>
<u>CAPACITORS</u>	
C4, C616	220K mmfd 400V
C605	470K mmfd 200V
C508	100 mfd Electrolytic 50V
C302A, C302B	20 x 20 x 20 x 20 mfd 450V
C7, C610	Electrolytic
C5, C6, C9, C510	Electrolytic 20-20-20-20 @ 450
C301A, C301B	40 x 40 mfd 450V Electrolytic
<u>COILS</u>	
L301	Filter Choke, 2.5H, 250MA
L1, L2	Focus Coil, Glasser-Steers
L3, L4	Peaking Coil 30-60 Microhenries adjustable
L602	Peaking Coil 90-130 Microhenries Adjustable
L603	Width Coil 3-16 Millihenries RCA #212R1
L601	Ringing Coil, 5.5-20 Millihenries RCA 201R3
L604	Deflection Yoke, 18.5 Millihen- ries RCA #222DI
	Linearity Coil, 1.5-8.3 Milli- henries RCA # 213R1
<u>TRANSFORMERS</u>	
T301	Power #838
T501	Vertical Output RCA #XD2039A or Triad #2876
T601	Horizontal Output #741, RCA230T1
<u>NETWORKS</u>	
N501	Vertical Integrator CRL#PC101

# STANDARD

3501 W. ADDISON ST. • CHICAGO 18, ILL.

PART NO. **A-8265/HO-215**

TYPE **FLYBACK**

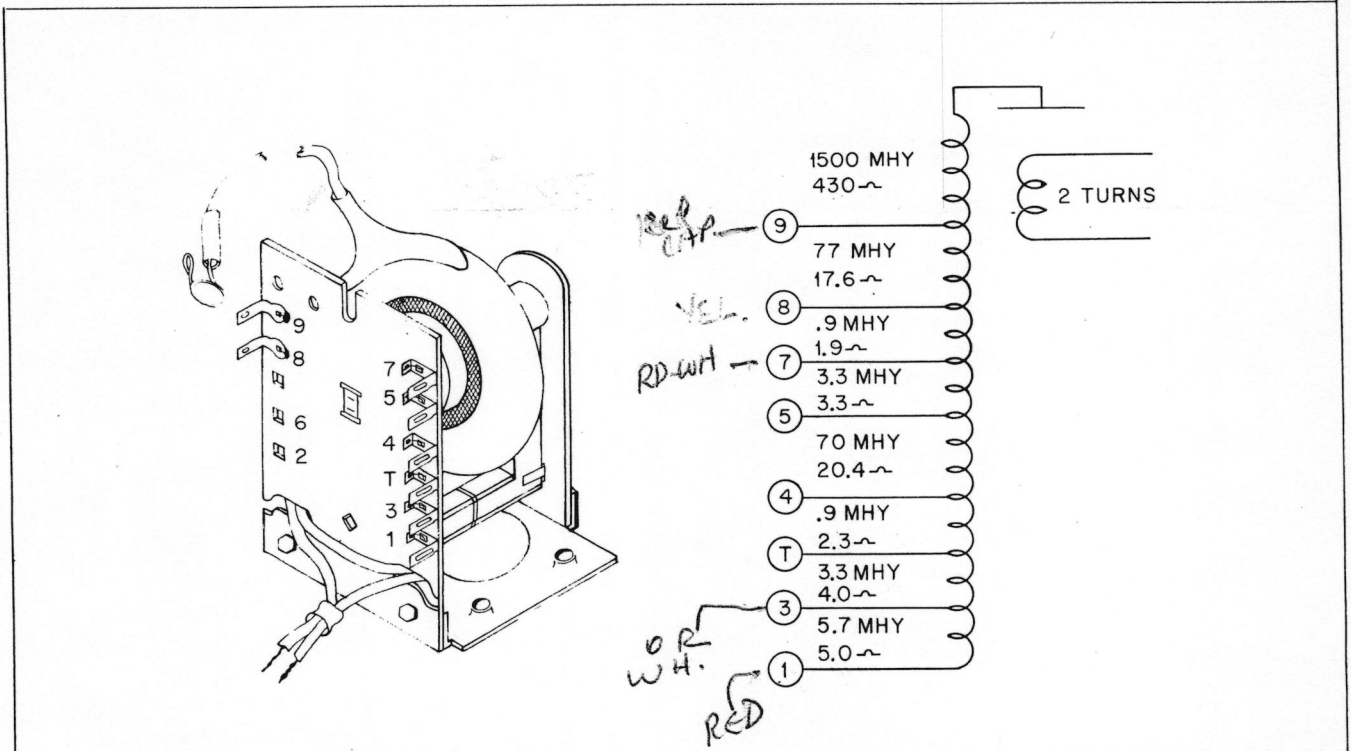
DATE **1-16-64**

S.D.S. NO. **6-1064**

## SERVICE DATA SHEET

COMPLETE SERVICE DATA FOR INSTALLATION

*Replaced  
11/16/73*



### APPLICATIONS:

#### CAPEHART

850349A-1, 850349B-1 [2&8]

#### FIRESTONE

53X337, 53X338. [3&9]

#### HALLCRAFTERS

55C180, 55D180. [1]

#### HOFFMAN

5184. [1]

5132A, 5132A-1. [4]

*FOR CONRAC CF17A  
CONNECT AS SHOWN - JUST  
LIKE ORIGINAL*

#### R. C. A.

230T1. [1]

#### SILVERTONE

521066. [5]

#### STROMBERG-CARLSON

161282, 161282-1. [6]

#### TRUETONE

53X338. [9&10]

#### WELLS-GARDNER

53X337, 53X338. [7]

### NOTES: [Bracketed numbers refer to notes below]

1. Mount and connect as original

2. Connect wire from original terminal No. 8 To A-8265/HO-215 Terminal No.	4 8	- 7	3 5	- 4	- T	2 3	1 1
3. Connect wire from original terminal No. 9 To A-8265/HO-215 Terminal No.	8 9	- 8	7 7	4 5	T 4	3 3	1 1
4. Connect wire from original terminal No. 7 To A-8265/HO-215 Terminal No.	6 9	4 8	- 7	3 5	- 4	2 T	1 3
5. Connect wire from original terminal No. 7 To A-8265/HO-215 Terminal No.	- 9	6 8	5 7	- 5	3 4	2 T	1 3
6. Connect wire from original terminal No. 4 To A-8265/HO-215 Terminal No.	3 9	- 8	- 7	- 5	- 4	2 T	1 3

7. Connect as in original circuit, except connect original terminal #7 to new terminal #5. Add a 56 mmfd @ 3KV capacitor in series with original terminal #6 lead and connect it to new terminal #5.

8. Connect a damping capacitor (approximately 47 to 68 mmfd @ 2KV) across yoke terminals #3 and #7. If necessary to reduce ringing, add a 1000 ohm 1/2 watt resistor in series with this capacitor.

9. Install new horizontal damping network consisting of a 56 mmfd capacitor @ 2KV minimum in series with 5600 ohm 1/2 watt resistor to high side of yoke.

10. Connect as in original circuit, except connect original terminal #7 to new terminal #5.

# STANCOR

3501 W. ADDISON ST. • CHICAGO 18, ILL.

PART NO. DY-11

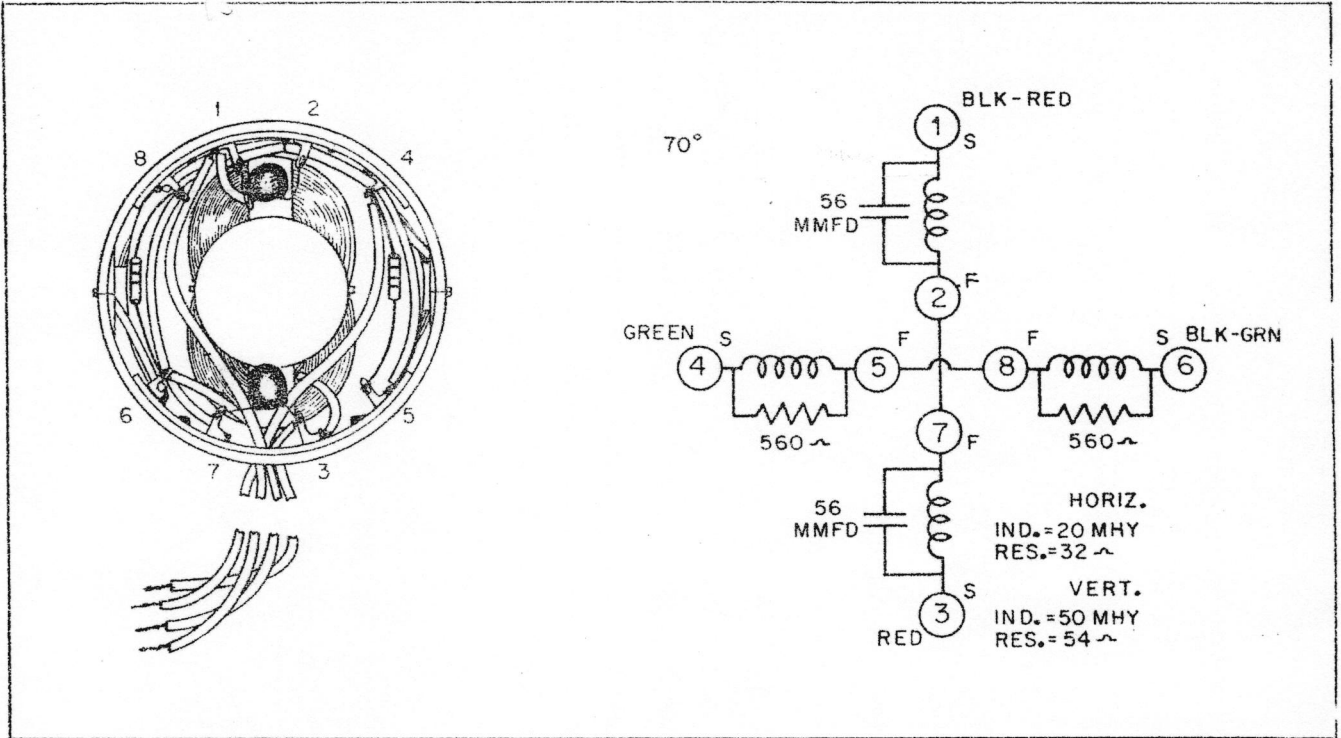
TYPE YOKE-70°

DATE 2-1-67

S.D.S. NO. 6-1067

## SERVICE DATA SHEET

*Replaced  
11/16/73*



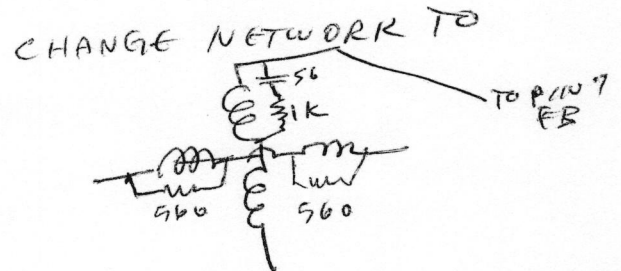
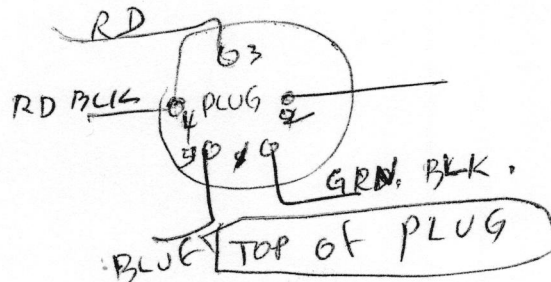
## APPLICATION INSTRUCTION DATA

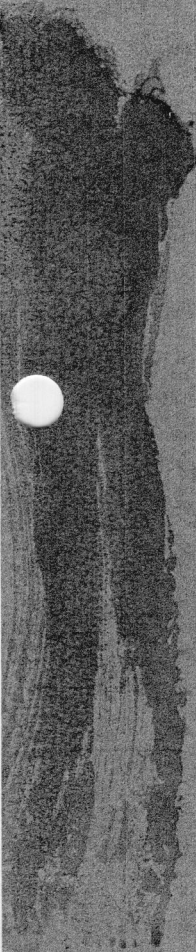
### MULTI-PURPOSE

For use in many manufacturer's chassis and models requiring 65-70 degree deflection.

May require the damping network to be changed to conform with original circuitry.

*FOR CONTRAC CF17A, REPLACE EXACTLY*







Contact information for this effort, and any other efforts at documenting and making freely available the manuals for the old laboratory classics, can be found at <http://www.bunkerofdoom.com> Please visit us.

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