JERROLD®

INSTRUCTION SHEET

435-471.1

SOLID-STATE

AUTOMATIC GAIN CONTROL UNIT

MODEL TAGC-213

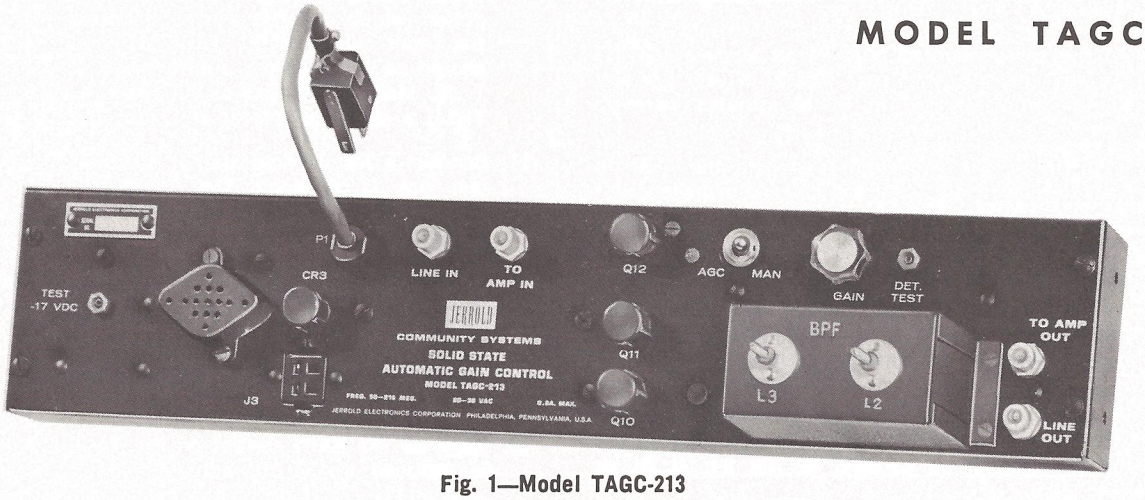

Fig. 1—Model TAGC-213

DESCRIPTION

Model TAGC-213 is designed specifically for use with solid-state trunk line amplifiers Model TML-1, from which it obtains a nominal 24 vac operating voltage. The unit receives its pilot carrier signal of 73.5 mc from a crystal-controlled carrier generator (Model CCG-73.5) at the head-end.

Model TAGC-213 automatically compensates for carrier level fluctuations over a range of 8 db from +5 db to —3 db by keeping output level variations constant within ±0.5 db.

Model TAGC-213 has a power bridging circuit capable of passing a-c and d-c for powering bridging amplifiers Model TBA-1 and line extender amplifiers Model TLE-1. A built-in regulated power supply transforms the 20-30 vac input to —17 volts d-c for operating the solid-state circuitry.

The unit is fully shielded in a metal housing and shipped with mounting brackets for installation in 19" relay racks.

Normal system requirements are for one TAGC-213 recommended at every third amplifier location, preferably at the master power supply location.

SPECIFICATIONS

FREQUENCY RANGE	54 to 216 mc
FLATNESS	±0.5 db
PILOT CARRIER FREQUENCY	73.5 mc
PILOT CARRIER INPUT LEVEL REQUIRED AT J1	+17 dbj*
AGC ACTION	Output constant within ±0.5 db for input changes from +5 db to —3 db.
MANUAL GAIN CONTROL RANGE	8 db down from full gain

*0 dbj = 1000 microvolts across 75 ohms.

IMPEDANCE, ALL TERMINALS	75 ohms
IMPEDANCE MATCH: J1, J2	VSWR 1.17:1 maximum (min. return loss 22 db)
J4, J5	VSWR 1.3:1 maximum (min. return loss 18 db)
INSERTION LOSS: J1, J2	0.35 db nominal, 0.5 db max.
J4, J5	1.0 db nominal, 1.5 db max.
A-C INPUT	20 to 30 vac
INTERNAL POWER SUPPLY OUTPUT	—17 vdc
CURRENT DRAIN	0.8 amp. max.

INSTALLATION

1. For standard 19" rack mounting, install the two angle brackets on Model TAGC-213 shipped with the unit; use the four 6-32 x ¼ BHSM black oxidized screws supplied in the accessory bag.
2. For cabinet mounting, install the TAGC-213 without the brackets. In both cases place the TAGC-213 beside the trunk amplifier Model TML-1; at bridging amplifier locations install the TAGC-213 between the TML-1 and TBA-1; see fig. 2.
3. Connect the cable-mounted plug P1 on Model TAGC-213 to the 4-pin socket J5 on Model TML-1; in very low ambient temperatures, allow up to 10 minutes warm-up before making measurements.
4. Connect a Jerrold field strength meter to the —30 db TEST jack J9 on Model TML-1 and check for presence of signal. Measure the signal level at channel 13 and record the reading.
5. The following jumper connections are to be made:
   a. from the TO AMP IN fitting on the TAGC-213 to the RF INPUT or to the RF & AC INPUT fitting on Model TML-1, depending on whether or not a-c is to be passed.
   b. from the TO AMP OUT fitting on the TAGC-213 to the RF OUTPUT or to the RF & AC OUTPUT fitting on the TML-1, depending on whether or not a-c is to be passed.
   c. for bridging amplifier locations a third jumper is required between the LINE OUT fitting on the TAGC-213 and the LINE IN fitting on the TBA-1; the TBA-1 is then powered via its cable mounted plug P5 from the 4-pin socket J3 on the TAGC-213 chassis.
6. Where no a-c is to be passed, RG-59/U type coaxial cable jumpers and F-59A fittings are sufficient. For jumpers carrying a-c use JT-404 type cable and FHC-404 connectors.
7. Measure the lengths required for the jumpers, then prepare the cables and install the fittings as described in Jerrold instruction book 435-345 and its addendum A1.
8. Interconnect the TAGC-213 as shown in fig. 2 according to the criteria outlined in step 5. Hand-tighten all connectors.
9. Set the AGC MAN switch on TAGC-213 to AGC position and turn GAIN control to maximum (fully clockwise).
10. With the TML-1 requiring a +8 dbj trunk line input and Model TAGC-213 requiring a 5 db reserve for control action (which includes a nominal insertion loss of 1 db), the input signal to the TAGC-213 (measured at ch. 13) should be 13 dbj. Thus, subtracting the insertion loss of 1 db, Model TAGC-213 at full gain will deliver to the TML-1 a signal at a level of 12 dbj.
11. Connect a Jerrold field strength meter to the —30 db IN test jack J3 on Model TML-1 and check for 12 dbj at ch. 13; actual reading should therefore be —30 + 12 = —18 db.
12. Connect the field strength meter to the —30 db OUT test jack J9 on Model TML-1; if necessary, adjust the TML-1 GAIN control to obtain a pilot carrier (73.5 mc) level of 21 db; this is the specified 17 db input level plus the TAGC-213 reserve of 4 db. The actual reading should be —30 + 21 = —9 db.
13. Back off the GAIN control on the TAGC-213 until output is reduced to 17 db; actual reading should indicate —30 + 17 = —13 db on the field strength meter.
14. To ensure optimum performance between the generator at the head-end and Model TAGC-213, it may be necessary to peak coils L2 and L3. Both coils are accessible on the top of the BPF unit mounted on the TAGC-213 chassis. Connect a VTVM to DET. TEST jack on the TAGC-213; loosen the lock nuts on both coils, then peak the coils for maximum negative bias voltage indication. After adjustment, re-lock the coils.
15. Wrench-tighten all connectors not more than 1/6 of a turn.

This completes the installation and operational set-up.

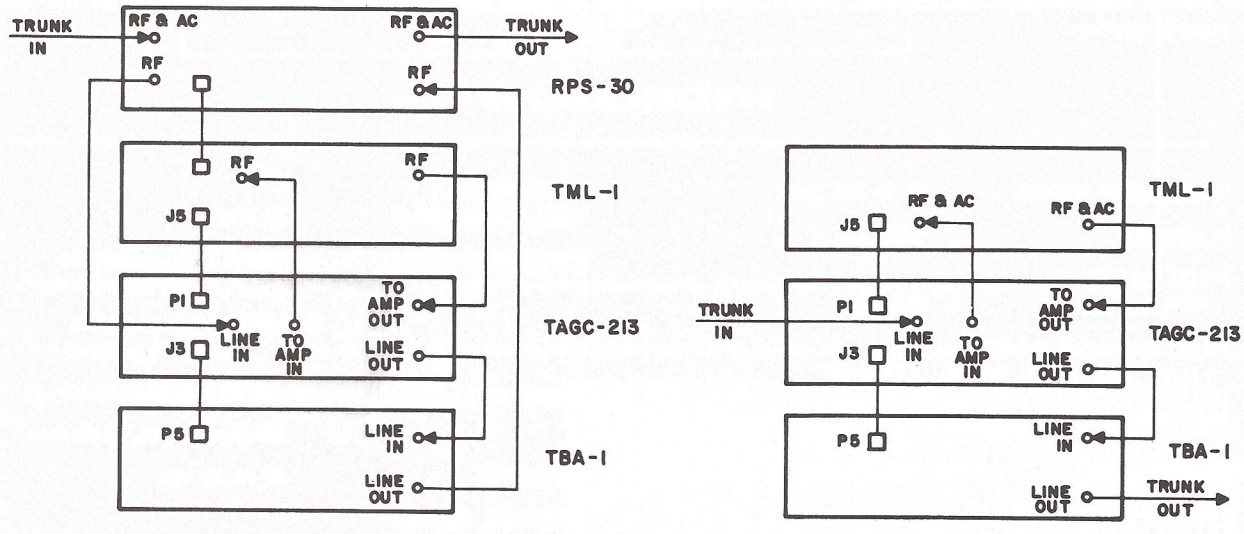

Fig. 2—Typical installations of Model TAGC-213 where a-c is carried on the trunk line cable.

MAINTENANCE

GENERAL

1. Low operating voltages and low current drain, thermistor-controlled solid-state circuitry and extensive quality control in production, assure long life and trouble-free operation of Model TAGC-213. Replacement of solid-state components should only be carried out by personnel experienced in transistor-circuitry and equipped with the necessary test instruments.

2. The circuit description and parts list together with the schematic circuit diagram will be an aid in servicing. Should field repair not be possible, it is preferable to return the unit to Jerrold's Service Department. Carefully pack the unit and ship it, with freight and insurance charges prepaid, together with a letter quoting the unit serial number and the difficulties encountered.

CIRCUIT DESCRIPTION

1. INTERNAL RECTIFIER AND FILTER NETWORK

Model TAGC-213 is powered from Model TML-1 via plug P1, applying a nominal 24 vac through r-f choke L12 to the half-wave rectifier CR3. The pulsating dc from CR3 is filtered by C28 and applied to the series voltage regulator Q1.

Resistors R31 and R32 provide turn-on bias for Q1 with filtering by C30. Q2, arranged in a common collector circuit for high input and low output impedance, provides the turn-off bias for Q1. Base current for Q2 is furnished by the load resistor R35 on Q3. Zener diode CR6 provides the emitter current for Q3. Resistor R33 applies a stabilizing current from the regulated —17 vdc line to CR6.

Base current for Q3 is derived from a bleeder network R34, R36, R37 and R38 across the regulated output, whereby potentiometer R36 permits setting the output to exactly —17 vdc.

2. RF AMPLIFIER STAGES

The input signal is applied via J1 to a directional coupler network T1, C1, C2 and R1 and is then coupled through C3 to the base of Q4. Base current for Q4 is derived via R2 and R3. DC degeneration is provided by R4 with C4 acting as high-frequency bypass.

Transformer T2 in the collector circuit is designed with a 2:1 impedance step-down ratio for matching into the base of Q5. The subsequent r-f amplifier stages have identical bias networks. The collector of Q5 is lightly coupled to a pair of helical resonators acting as a narrow bandpass filter at 73.5 mc. The output of the resonators is coupled through C9 to the base of Q6. Transformer 3 is coupled through C12 to the base of Q7. Coil L6 in the collector circuit of Q7 is coupled into a voltage doubling detector consisting of C14, C15, CR1, CR2 and gain control potentiometer R15. Detector test point TP2 permits monitoring the detector output for alignment purposes.

3. DC AMPLIFIER STAGES

Control voltage for the first dc amplifier Q8 is obtained from R15 via R17. C17 serves as bypass for r-f frequencies. The dc across the gain control can be obtained either from the detector and r-f amplifier stages with switch S1 in AGC position, or via R16 and R18 with switch S1 in MAN position.

Resistor R40 applies a reverse bias voltage obtained from a divider network R39 and R41 to the emitter of Q8. This reverse bias must be overcome by the control voltage from the detector before Q8 will conduct. For ultra-stable operation under extreme variations in ambient conditions, Q8 is operated in a constant temperature oven. RT3 serves as the sensing element in the oven and drives Q9 and Q12. The bias of Q9 is determined by the resistance of RT3. This resistance is a function of temperature. A fixed reference voltage is supplied by R24 and Zener diode CR7 to the emitter of Q9.

4. OUTPUT STAGE

A variable attenuator, arranged in a bridged "T" resistance circuit, employs thermistors RT2 and RT4 in the shunt and series arms. The attenuation is varied by heating RT2 and RT4 with dc from Q10 and Q11. RT2 and RT4, too, are contained in the constant temperature oven for stability with external temperature variations. The r-f signal is then passed from J4 to J5, with choke L11 permitting ac bypass. Capacitors C24 and C25 isolate the attenuator from the 60-cycle voltage, and chokes L8, L9 and L10 isolate the attenuator from r-f ground.

ASSEMBLY			REF. DWG. NO.: E861-657	
ITEM	SCHEM. DESIG.	QTY.	DESCRIPTION	JERROLD PART NO.
			CAPACITORS	
1	C1	1	2.0 pf, 10%, 500 v, QC	122-030
2	C2	1	24 pf, 10%, 500 v, QC	122-025
3	C3 thru C15	13	0.02 uf, ceramic disc	124-065
4	C16, 17, 18, 19, 20, 21, 22, 32, 33	9	1500 pf, 20%, feed-thru	129-208
5	C23, 24, 25	3	1000 pf, ceramic disc	124-049
6	C26, 27, 29	3	0.01 uf, 10%	124-134
7	C28	1	1000 uf, 50 v, electrolytic	127-061
8	C30	1	100 uf, 50 v, electrolytic	127-050
9	C31	1	25 uf, 15 v, electrolytic	127-065
10	C40	1	0.01 uf, GMV, ceramic disc	124-031
			Note: C34 thru C39 not assgd.	
			CONNECTORS	
11	P1	1	4-pin plug, Beauchaine, P-3304-CCT-L	184-047
12	J1, 2, 4, 5	4	Coaxial fittings, F-61A	C821-155-1
13	J3	1	4-pin socket, Cinch-Jones C-304-AB	B184-018
			DIODES	
14	CR1, 2	2	K3A, Kemtron	139-102
15	CR3	1	SOD200KS, silicon, Solitron	137-726
16	CR4, 5	2	CER-68A, silicon, Solitron	137-718
17	CR6, 7	2	IN750A, Zener, Motorola	137-724
			RESISTORS	
18	R1, 42	2	75 ohms, 5%, ¼ w	112-954
19	R2, 6, 8, 11	4	2 k, 5%, ¼ w	112-930
20	R3, 5, 9, 12	4	3.6 k, 5%, ¼ w	112-999
21	R4, 7, 10, 13, 17, 26, 37	7	560 ohms, 5%, ¼ w	112-104
22	R14	1	100 k, 5%, ¼ w	112-935
23	R15	1	5 k, potentiometer	A118-134
24	R16, 23, 25	3	3 k, 5%, ¼ w	112-934

ASSEMBLY			REF. DWG. NO.: E861-657	
ITEM	SCHEM. DESIG.	QTY.	DESCRIPTION	JERROLD PART NO.
25	R18	1	15 k, 5%, ¼ w	112-990
26	R19	1	3.9 k, 5%, ¼ w	112-979
27	R20	1	47 ohms, 10%, 2 w	112-196
28	R21	1	68 ohms, 5%, ¼ w	112-916
29	R22	1	390 ohms, 5%, ¼ w	112-308
30	R24, 39	2	820 ohms, 5%, ¼ w	112-976
31	R27, 28	2	75 ohms, 2%, ¼ w	115-174
32	R29	1	50 ohms, 20 w, Hardwick Hindle Blue Ribbon B454	113-089
33	R30	1	1 ohm, 5%, 2 w	110-105
34	R31, 32	2	470 ohms, 5%, 1 w	112-318
35	R33	1	620 ohms, 5%, ½ w	112-335
36	R34	2	1.5 k, 5%, ¼ w	112-966
37	R35	1	2.7 k, 5%, ¼ w	112-931
38	R36	1	100 ohms, 10%, 2 w, potentiometer	118-025
39	R38	1	47 ohms, 5%, ¼ w	112-992
40	R40	1	10 ohms, 5%, ¼ w	112-077
41	R41	1	30 ohms, 5%, ¼ w	112-982
			THERMISTORS	
42	RT1	1	28.2 ohms @ 25°C	110-025
42	RT2	1	5.0 k @ 25°C, Victory Eng. 35A2	110-037
43	RT3	1	5.0 k @ 25°C, Victory Eng. 35D9	110-038
44	RT4	1	1.0 k @ 25°C, Victory Eng. 31A3	110-036
			TRANSISTORS	
45	Q1	1	2N456A, Texas Instr.	130-104
46	Q2, 9	2	2N1304, Texas Instr.	130-122
47	Q3	1	2N1371, Texas Instr.	130-123
48	Q4, 5, 6, 7	4	S1140, Fairchild	S130-112
49	Q8	1	2N1309, RCA	130-127
50	Q10, 11	2	2N2662, Texas Instr.	130-131
51	Q12	1	2N2663, Texas Instr.	130-133

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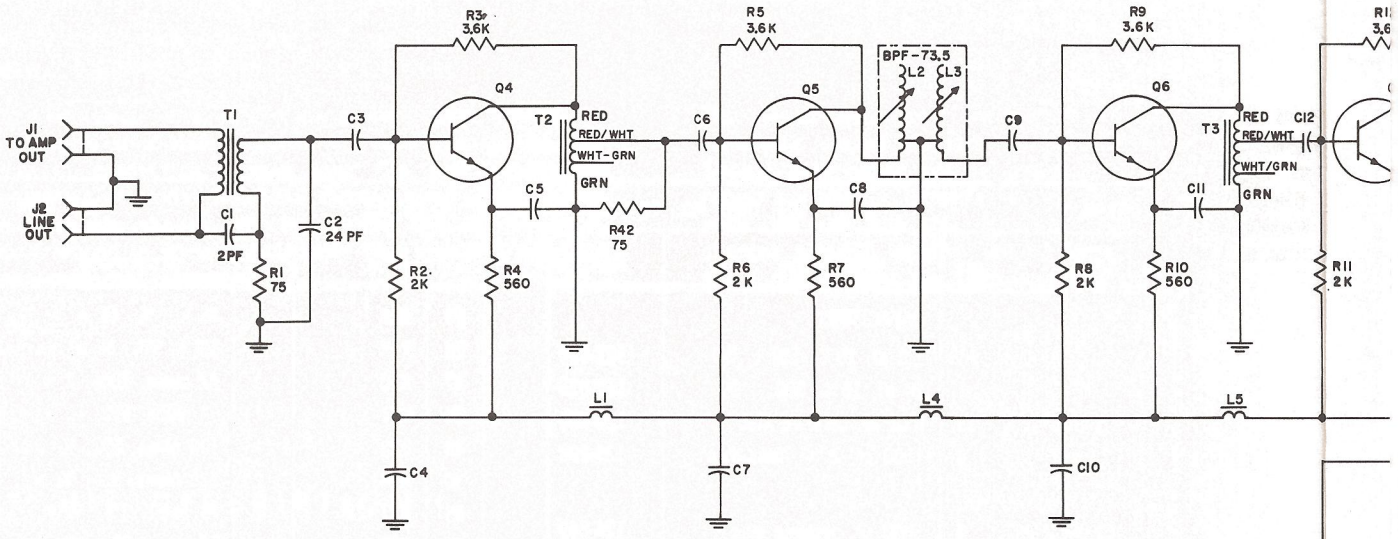

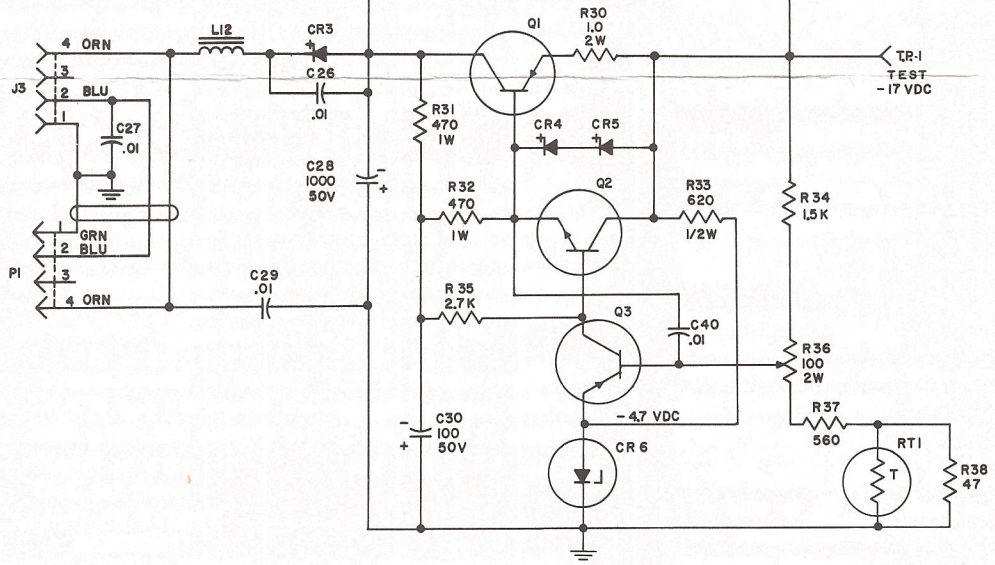

NOTES:

1. UNLESS OTHERWISE SPECIFIED;
   A. ALL CAPACITOR VALUES GIVEN IN
   B. ALL RESISTORS IN OHMS, 5%, 1/
2. ALL UNMARKED CAPACITORS ARE .
3. ALL VOLTAGES MEASURED WITH A
4. DO NOT MEASURE RESISTANCE WIT
   TRANSISTORS IN CIRCUIT.

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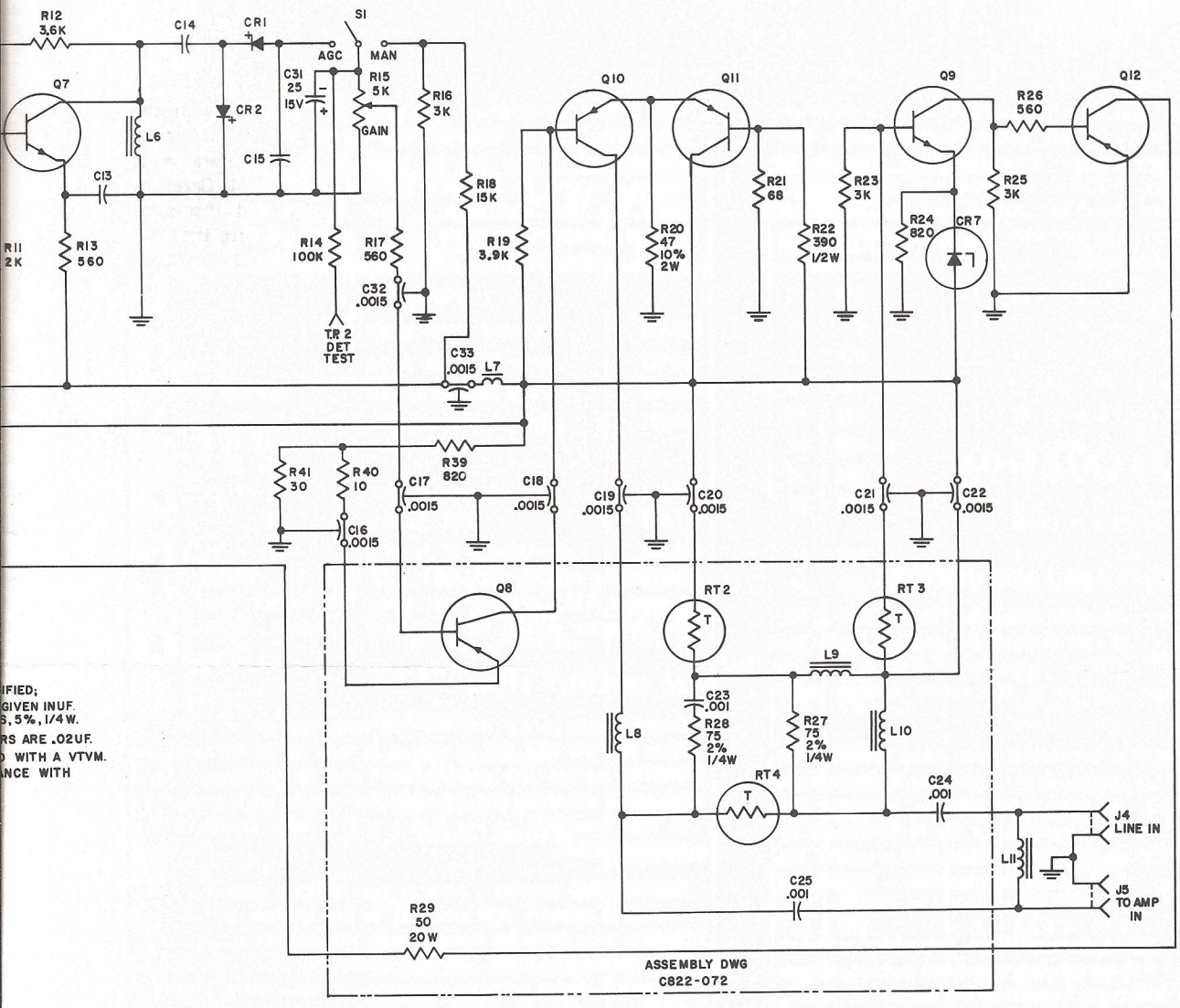

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GIVEN INUF.
S, 5%, 1/4W.
RS ARE .02UF.
WITH A VTVM.
NCE WITH

ALL DATA SUBJECT TO CHANGE WITHOUT NOTICE.

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COMMUNITY SYSTEMS DIVISION

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