

INSTRUCTION BOOK

for

TYPE 26W LIMITER AMPLIFIER

COLLINS RADIO COMPANY
Cedar Rapids, Iowa

520 9291 00
1 January 1953

GUARANTEE

The equipment described herein is sold under the following guarantee:

Collins agrees to repair or replace, without charge, any equipment, parts, or accessories which are defective as to design, workmanship or material, and which are returned to Collins at its factory, transportation prepaid, provided

- (a) Notice of the claimed defect is given Collins within one (1) year from date of delivery and goods are returned in accordance with Collins' instructions.
- (b) Equipment, accessories, tubes, and batteries not manufactured by Collins or from Collins' designs are subject to only such adjustments as Collins may obtain from the supplier thereof.
- (c) No equipment or accessory shall be deemed to be defective if, due to exposure or excessive moisture in the atmosphere or otherwise after delivery, it shall fail to operate in a normal or proper manner.

Collins further guarantees that any radio transmitter described herein will deliver full radio frequency power output at the antenna lead when connected to a suitable load, but such guarantee shall not be construed as a guarantee of any definite coverage or range of said apparatus.

The guarantee of these paragraphs is void if equipment is altered or repaired by others than Collins or its authorized service center.

No other warranties, expressed or implied, shall be applicable to any equipment sold hereunder, and the foregoing shall constitute the Buyer's sole right and remedy under the agreements in this paragraph contained. In no event shall Collins have any liability for consequential damages, or for loss, damage or expense directly or indirectly arising from the use of the products, or any inability to use them either separately or in combination with other equipment or materials, or from any other cause.

HOW TO RETURN MATERIAL OR EQUIPMENT. If, for any reason, you should wish to return material or equipment, whether under the guarantee or otherwise, you should notify us, giving full particulars including the details listed below, insofar as applicable. If the item is thought to be defective, such notice must give full information as to nature of defect and identification (including part number if possible) of part considered defective. (With respect to tubes we suggest that your adjustments can be speeded up if you give notice of defect directly to the tube manufacturer.) Upon receipt of such notice, Collins will promptly advise you respecting the return. Failure to secure our advice prior to the forwarding of the goods or failure to provide full particulars may cause unnecessary delay in handling of your returned merchandise.

ADDRESS:

Collins Radio Company
Sales Service Department
Cedar Rapids, Iowa

INFORMATION NEEDED:

- (A) Type number, name, and serial number of equipment
- (B) Date of delivery of equipment
- (C) Date placed in service
- (D) Number of hours of service
- (E) Nature of trouble
- (F) Cause of trouble if known
- (G) Part number (9 or 10 digit number) and name of part thought to be causing trouble
- (H) Item or symbol number of same obtained from parts list or schematic
- (I) Collins' number (and name) of unit sub-assemblies involved in trouble
- (J) Remarks

HOW TO ORDER REPLACEMENT PARTS. When ordering replacement parts, you should direct your order as indicated below and furnish the following information insofar as applicable. To enable us to give you better replacement service, please be sure to give us complete information.

ADDRESS:

Collins Radio Company
Sales Service Department
Cedar Rapids, Iowa

INFORMATION NEEDED:

- (A) Quantity required
- (B) Collins' part number (9 or 10 digit number) and description
- (C) Item or symbol number obtained from parts list or schematic
- (D) Collins' type number, name, and serial number of principal equipment
- (E) Unit sub-assembly number (where applicable)

Addenda

26W-1 Limiting Amplifier Book
(520 9291 00)

DEC 19 1957

This addenda describes a recent tube type change along with several resistor changes. It also adds some Installation notes and an adjustment procedure. The adjustment procedure supersedes a procedure given in the instruction book.

In all equipments serial number 492 and higher, the tube V102 has been changed to a type 5814A. Several resistor changes have been made to accommodate this new tube. All parts lists changes and corrections are herewith shown:

<u>Symbol</u>	<u>Function</u>	<u>Description</u>	<u>Part Number</u>
M101	Current and Voltage	METER: 0-5; 0-50; 0-500; 50 scale divisions; 0-1 ma dc; 2% accuracy <u>+1%</u> ; 3" square case.	458 0053 00
F119	Limiter Bridge	RESISTOR: Fixed Composition; 6800 ohm <u>+10%</u> ; 2 watts.	745 5687 00
R120	Limiter Bridge	RESISTOR: Same as ref R119.	
R144	Limiter Time Constant	Deleted.	
R145	Limiter Time Constant	RESISTOR: Fixed Composition; 3.3 meg <u>+10%</u> ; 1 watt.	745 3499 00
R146	Limiter Time Constant	RESISTOR: Fixed Composition; 5.6 meg <u>+10%</u> ; 1 watt.	745 3510 00
R155	Transient Voltage Divider	RESISTOR: Fixed Composition; 4700 ohm <u>+10%</u> ; 1 watt.	745 3380 00
V102	Limiter	TUBE: Type 5814A; twin triode.	253 0013 00
X102	Socket for V102	SOCKET ASSEMBLY: Miniature nine pin socket and riveted plate assembly.	541 8172 002

The above tube change affects figures 2-3, 2-6, and 5-1. There is a new, up-to-date main schematic, figure 7-3, attached to this addenda. The tables on pages 2 and 20 should be corrected to show the above tube change.

Most of the following material is of supplemental nature, however, the BALANCING PROCEDURE shown here should be used in place of the one given in the instruction book on page 12.

1. INSTALLATION NOTES:

Ascertain the level of the audio signal being delivered to the input of the 26W-1 with the studio equipment in normal operation. The Collins 212A and 212B Consoles, as delivered, supply +16VU to the line when the console VU meter reads "Zero VU". The Collins 212E and 212F Consoles, as delivered, supply +8 VU to the line when the console VU meter reads "Zero VU". Normal studio program operation would be with the console VU meter peaking at "Zero VU" or 100 on the percent scale.

If the 26W-1, as delivered, is connected directly to the line from the console, as is sometimes common in stations where the studio and limiter are in the same building, it will result in lack of good control range on the input control of the 26W-1. With such a set-up the input control of the 26W-1 will have to be operated on the first step or nearly turned off to avoid unduly high limiting as evidenced by the limiting meter acting violently as the 26W-1 input gain control is just barely "cracked".

The above does not become a problem where the console is located in a studio remote from the 26W-1, where the input to the telephone lines must be held to "Zero to +8 VU".

The obvious need in the "one building" operation is to lower the console output level by adding an audio attenuating pad between the console and 26W-1 Limiter. Refer to the Type 26W-1 complete schematic, figure 7-3 and to figure 3-1, and note that a 20 db pad is built in but not connected as delivered. This can be connected to supply the needed adjustment of level. As an alternate, a small pad of 2 watt resistors can be inserted in the output lines of the console at the point where they connect to the main console terminal board. The 20DB pad will be required in most installations.

2. ROUTINE OPERATION:

The following procedure is based on these assumptions:

- a. The limiter has just been delivered from the factory and installed per Section III of the instruction book.
- b. The limiter has been previously installed and balanced per balancing procedure, as explained later in paragraph 3. of this addenda.

Start out by turning both OUTPUT and INPUT LEVEL controls of the limiter off (extreme counterclockwise positions). Set the METER SELECTOR switch on position "A" and the VOLUME UNITS switch on 10. Set the OPERATE TIME switch at 1.0 milliseconds and the "RELEASE TIME" switch at 2.5 seconds.

Feed program material or music from the console at the normal level that the control room operators will be using. This would be with the console VU meter peaking at 100 percent. Taking into consideration the previous installation items covered, the signal at the input to the 26W-1 will be peaking somewhere between -5 and +8 VU.

Gradually increase the 26W-1 INPUT LEVEL control until the 100 percent peaks on the console output meter result in 5 to 6 db of limiting, as indicated on left hand meter, (approximately 1/5 scale).

Leave the OUTPUT LEVEL of the 26W-1 turned off. Turn on the transmitter and adjust for normal RF output. Adjust the modulation monitor carrier input controls in the normal manner, being sure to adjust the tuning control accurately to a peak before carefully adjusting the straight monitor gain control for the index setting.

Set the "flasher control" dial on the monitor for 95 percent.

Gradually increase the OUTPUT LEVEL control of the 26W-1 until the modulation monitor "flasher" just lights with program peaks which result in the 5 to 6 db limiting peaks previously mentioned.

Adjust the VOLUME UNITS switch to the multiplier setting which results in comparable action of the 26W-1 output VU meter and the console VU meter at audio signals below the threshold of the limiter. This output meter operation can be adjusted otherwise to suit the individual likes of the station engineer.

The OPERATE TIME and RELEASE TIME controls can be experimented with as the engineer gets familiar with the equipment. Some engineers find by experiment that they like different settings, for their average type of program, than other engineers.

3. BALANCING PROCEDURE: (Use this procedure in place of the one given in paragraph d.(1) of page 12.)

The first thing that is necessary is to be sure that the static cathode currents (no signal) of the 6F6 or 1621 output tubes are equal within 2 ma. (two small meter divisions) as measured with the "METER SELECTOR" switch on positions "D" and "F" with the "TEST-NORMAL" switch in the "NORMAL" position. The engineer should go through his stock of output tubes and pair off tubes which meet this degree of uniformity for future use.

Before going further with the balancing procedure be sure the transmitter is turned off and that the output of the 26W-1 is terminated with the 600 ohm pad of the transmitter audio input circuit. In lieu of this, the line to the transmitter can be disconnected and a 600 ohm 10 watt resistor used as a terminating load for the 26W-1.

3.1. ADJUSTMENT OF BALANCE CONTROL (R-154)

If an AC voltage is applied to the grids of the limiter stage (V-102) the output from the amplifier should be zero because the inphase voltage on the grids will cancel out if the system is balanced. In actual practice the output will

drop as the balanced condition is reached, but will not fall to zero. A balancing procedure follows:

- a. Turn the INPUT attenuator to OFF, and the OUTPUT attenuator to "O". Set the METER switch to "F", and the VOLUME UNITS switch to 4.
- b. Apply an AC voltage to the grids of V-102. This can be easily done by jumpering one side of the 6.3 vac filament (V-104 pin #7) to the hot side of C-109. This applies 3.15 vac 60 cps to the grids of V-102.
- c. Adjust R-154 for minimum output as shown on M-102. While adjusting R-154, turn up the OUTPUT attenuator so a sharp indication of the dip may be seen for accurate adjustment. If no dip, or one of 10 db or less is encountered, a new tube should be substituted for V-102.

4. CORRECTIONS TO INSTRUCTION BOOK.

4.1. Change Reference Data on page 2 to read as follows:

Under d. INPUT LEVEL: Change to read: -30 to +20 dbm.

Under f. OUTPUT LEVEL: Change to read: -4 to +28 dbm.

Under k. HUM AND NOISE: Change to read: 63 db below +15 dbm output level.

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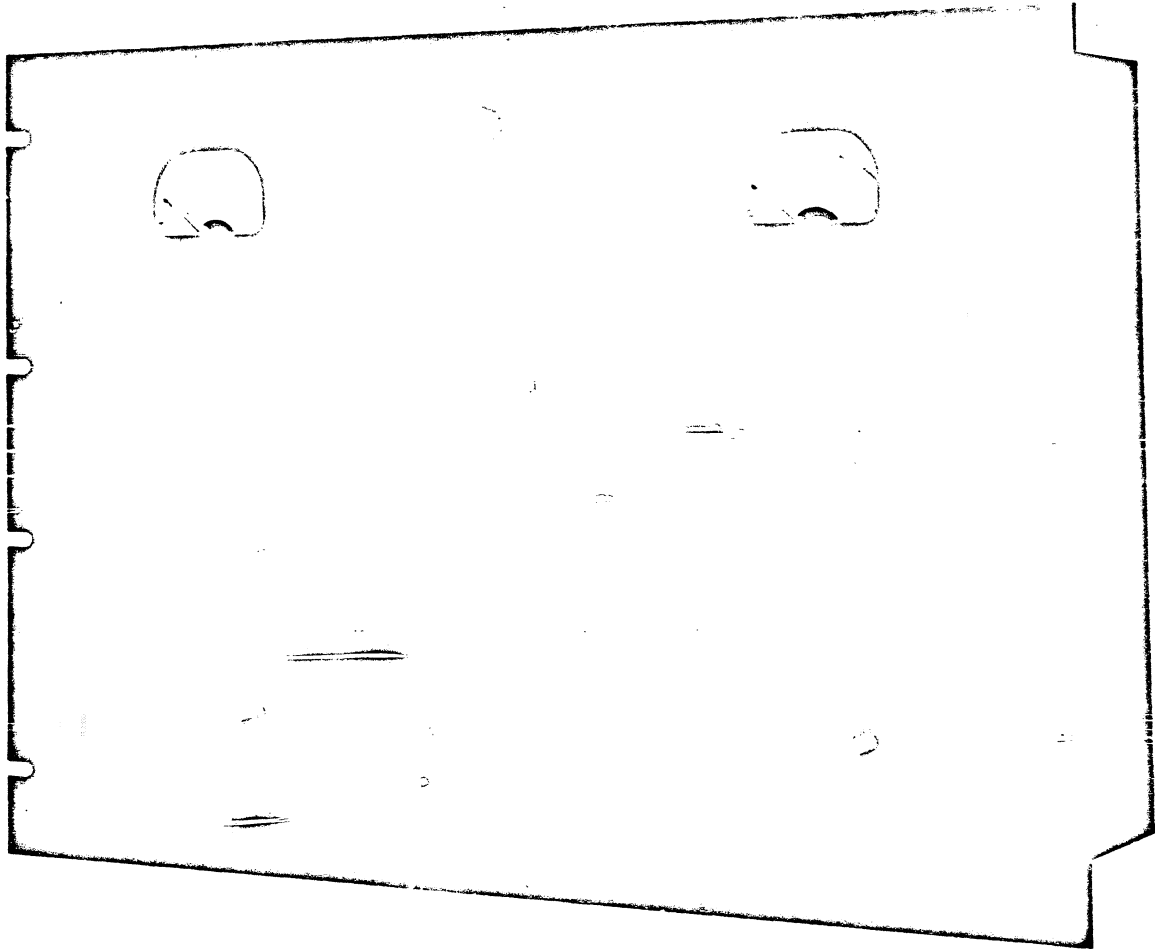


Figure 1-1. Type 26 W Limiting Amplifier

SECTION I

GENERAL DESCRIPTION

1. GENERAL.

a. This instruction book is to be used as a guide to the installation, adjustment, operation and maintenance of the Collins Type 26W Peak Limiting Amplifier. Refer to Figure 1-1.

b. The Collins Type 26W limiting amplifier is designed for use in any AM or FM installation where it is desired to control the amplitude of audio frequency peaks. In transmitter applications it will prevent overmodulation by limiting loud audio passages. This limiting action permits a higher average modulation level resulting in an increase in the transmission range or service area of the signal and an increase in the over-all efficiency of the transmitter. When used in conjunction with recording equipment or public address systems it prevents overloading and by raising the average audio level improves the signal to noise ratio.

c. EQUIPMENT DESCRIPTION.

(1) The Type 26 W is constructed to mount in any standard 19" relay rack or cabinet such as the Collins Type 19G-2 or 19G-3. A vertical mounting space of 14" is required. The equipment is assembled on a vertical chassis in such a manner that all wiring and circuit components are accessible by removing a dust cover at the rear of the chassis. A hinged door in the front panel provides access to the tubes. A chassis is open at top and bottom assuring ventilation of tubes and transformers.

(2) The Collins 26W is a general purpose program amplifier including means for preventing the peak output signal from exceeding a certain pre-determined level. Metering facilities provide a continuous visual indication of operating conditions. A self contained power supply is included in the equipment.

2. REFERENCE DATA.

a. The following apparatus is included with each standard shipment.

<u>Collins Type No.</u>	<u>Description</u>	<u>Overall Dimensions</u>	<u>Weight</u>
26W	Limiting amplifier	14" x 19" x 9"	45 lbs.
520 9291 00	Instruction book		

SECTION I

GENERAL DESCRIPTION

- b. FREQUENCY RESPONSE: 30-15,000 cps ± 0.5 db.
- c. INPUT IMPEDANCE: 200 ohms, 600 ohms or bridging input.
- d. INPUT LEVEL: -30 to +20 ~~W.~~ dbm
- e. OUTPUT IMPEDANCE: 600 ohms balanced or unbalanced to ground.
- f. OUTPUT LEVEL: -4 to +26 ~~W.~~ dbm
- g. COMPRESSION RATIO: 20/1 in db above verge of compression.
- h. OPERATE TIME: adjustable 0.1, 0.3, 1.0, 3.0, 10.0 milliseconds.
- i. RELEASE TIME (for 90% gain recovery): adjustable, 0.1, 0.5, 1.0, 2.5 or 5.0 seconds.
- j. DISTORTION: Harmonic distortion below 1% rms at any frequency and input and output level within the above ranges, and with any degree of compression below 15 db.
- k. HUM AND NOISE: ~~72 db below output level for all settings of input and output levels.~~ *62 db below +15 dbm output level*
- l. POWER SOURCE: 105-125 volts a-c, 50/60 cps, single phase.
3. VACUUM TUBE COMPLEMENT. - The vacuum tubes employed in the 26W Equipment are listed below.

<u>Quantity</u>	<u>Tube Type</u>	<u>Function</u>
1	6N7	Input Amplifier
1	6N7GT/G 5814A	Limiter
1	6H6GT/G	Limiter Control
1	6N7	Interstage Amplifier
2	1261 (6F6)	Output Amplifier
1	5V4G	Rectifier