

FIELD ENGINEERING BULLETINTITLE: CHANGING OPERATING-SPEED PAIR AND
MASTER BIAS OPERATION**I. APPLICABILITY**

All ATR-100's.

II. PURPOSE

To change operating-speed pair and master bias operation for the ATR-100 Recorder/Reproducer.

III. DISCUSSION

The ATR-100 can operate at any tape-speed pair selected from the following speeds: 3.75, 7.5, 15, and 30 in/s. Machines shipped from the factory are set to operate at 7.5 and 15 in/s with four-speed master bias operation. When a speed is selected on the transport control panel for which the signal or master bias has not been set up, the lockout indicator will light and play and record modes for that speed will be inoperative. To change operating-speed pair and master bias operation, jumper plugs are repositioned on audio control PWA no. 5 and on the PADNET PWA (s).

The jumper plugs on the audio control PWA no. 5 permit the user to program the ATR-100 for two-speed dual master bias operation or four-speed master bias operation. When the ATR-100 is programmed for two-speed dual master bias operation, a switch on the front panel of the audio control PWA no. 5 (Figure 1) enables the operator to select one of two different master bias levels for each of the two operating speeds. When the recorder is programmed for four-speed operation, the switch is permanently placed in the left-hand position and a single master bias level is provided for each speed. This master bias level is automatically switched for the speed selected on the transport control panel.

NOTE:

If the audio control PWA no. 5 jumpers are set for four-speed master bias operation, it is only necessary to reset jumpers on each PADNET PWA when changing operating speed pair.

When the audio control PWA no. 5 jumpers are set for two-speed dual master bias operation, then the two speeds selected on the audio control PWA no. 5 must match those selected on the PADNET PWA (s), or the lockout circuitry will operate.

IV. PROCEDURE**A. Operating Speed Pair Change**

1. With power off, remove the PADNET PWA for each channel from the electronics assembly.
2. Position HI speed jumper J1 to the desired high speed 30, 15, or 7.5-in/s position (Figure 2).
3. Position LO speed jumper J2 to the desired low speed 15, 7.5, or 3.75-in/s position. Reinstall PADNET PWA (s).

B. Two-Speed Dual Master Bias

1. With power off, remove audio control PWA no. 5 from the electronics assembly.

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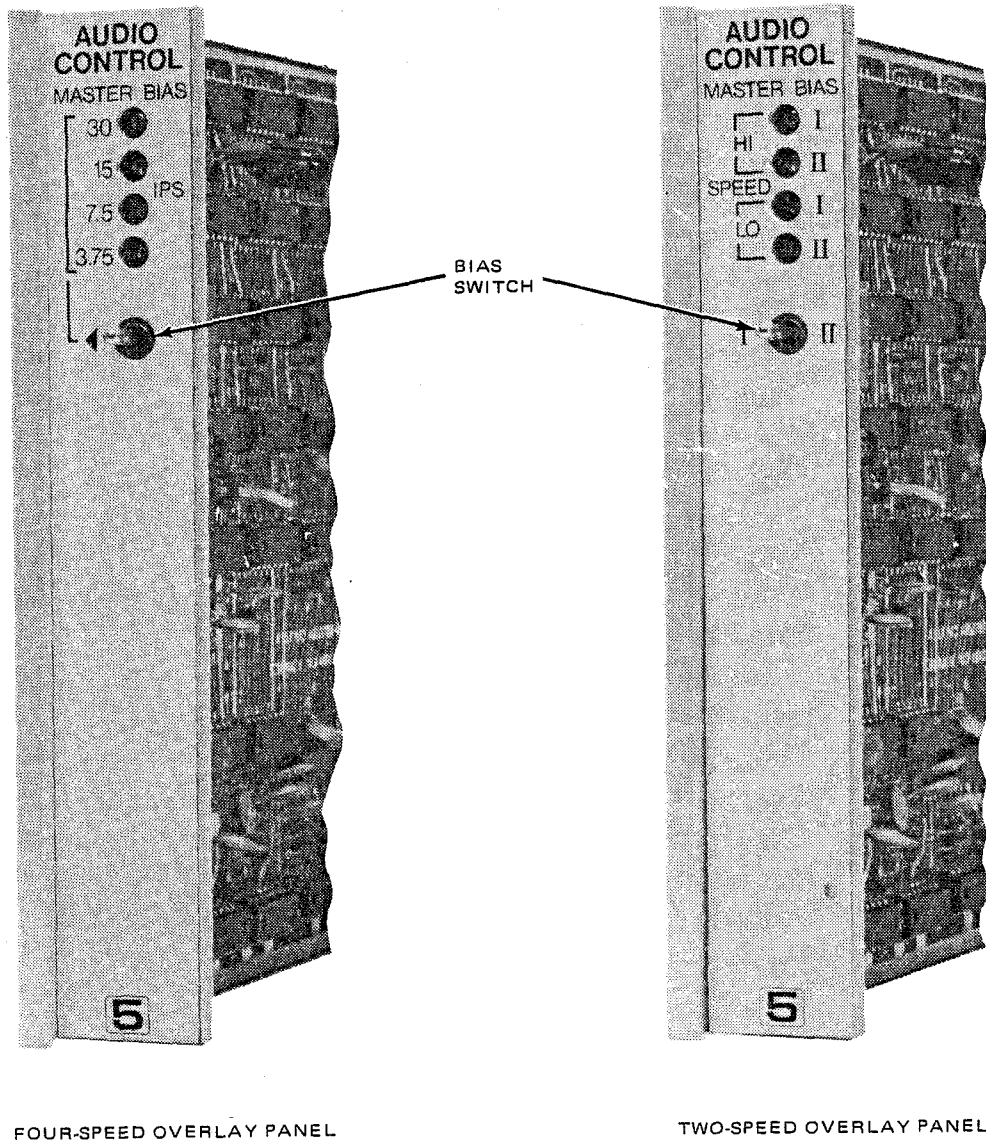
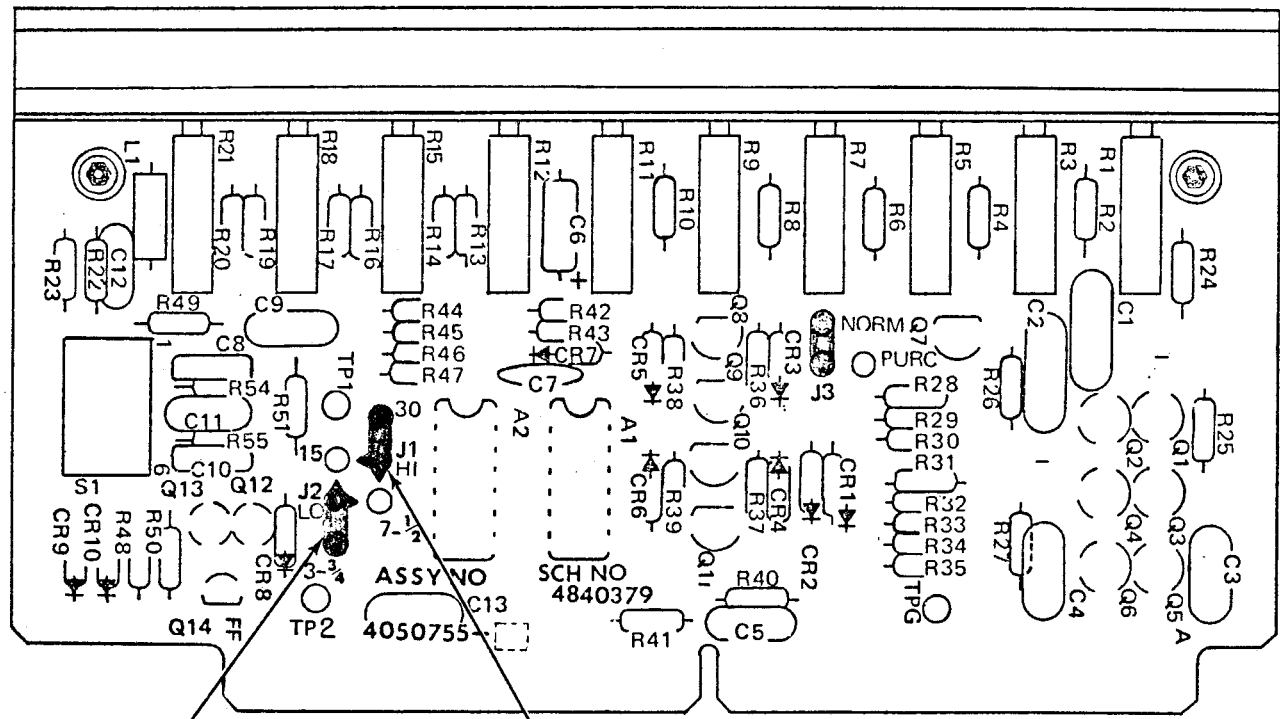


Figure 1. Overlay panels, Audio Control PWA No. 5.

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LO-SPEED JUMPER J2
(SHOWN IN 3-75 IN/S
POSITION)

HI-SPEED JUMPER J1
(SHOWN IN 30-IN/S
POSITION)

Figure 2. Speed Selection Jumpers, Padnet PWA.

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2. If two-speed overlay panel (Figure 1) is not in the front position on the PWA, remove front-panel screw, interchange overlay panels, and reinstall screw.
3. Position HI speed jumper J1 to the desired high speed 30, 15, or 7.5-in/s position (Figure 3).
4. Position LO speed jumper J2 to the desired low speed 15, 7.5, or 3.75-in/s position.
5. Position jumpers J3 and J4 to the S (stored) position. Reinstall audio control PWA no. 5.
6. For each new speed selected, perform the appropriate signal system alignment procedure indicated in this FEB.

C. Four-Speed Master Bias

1. With power off, remove audio control PWA no. 5 from the electronics assembly.
2. If four-speed overlay panel (Figure 1) is not in the front position on the PWA, remove front-panel screw, interchange overlay panels, and reinstall screw.
3. Position jumper J1 to the 30-in/s position (Figure 3).
4. Position jumper J2 to the 7.5-in/s position.
5. Position jumper J3 to the 15-in/s position.
6. Position jumper J4 to the 3.75-in/s position. Reinstall audio control PWA no. 5.
7. For each new speed selected, perform the appropriate signal system alignment procedure indicated in this FEB.

NOTE:

Rejumping of the "PADNET" PWA only changes the operating-speed pair; it is still necessary to re-adjust both reproduce and record equalization to conform to the desired equalization standard at the new speed, or speeds, which have been selected.

D. Signal System Alignment

The following information is a guide to aligning an ATR-100 system for a speed set other than the factory-delivered configuration. It is a routine procedure, and assumes that the user is familiar with professional audio recorders and their routine alignment. Detailed signal system alignment procedures are included in the ATR-100 Operation and Maintenance manual, Catalog No. 4890407, soon to be released.

1. Reproduce Alignment

When Ampex standard alignment tapes are used, note that the reference 700-Hz tone (500 Hz at 3.75 in/s) is at 185 nWb/m. If the system operating level is to be set to 370 nWb/m for use with Ampex 456 tape, then the standard tape reference level will play back nominally 6 dB below the required output level (or -6 VU). Similarly,

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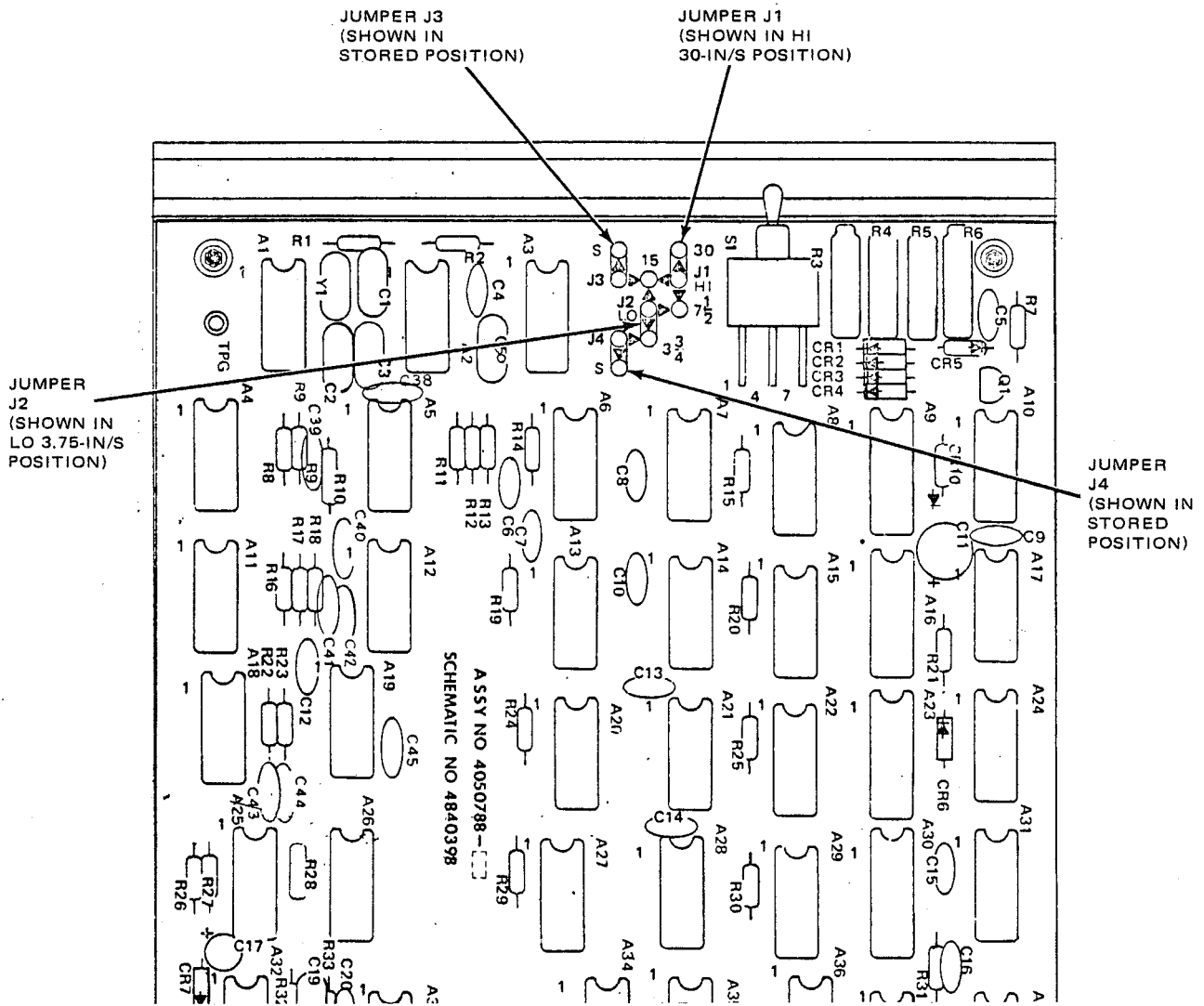


Figure 3. Speed Selection Jumpers, Audio Control PWA No. 5.

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if a 260-nWb/m operating level is to be used, the alignment tape will play back nominally 3 dB low.

When the alignment tape is full width, there will be an error in the level setting due to fringing effects. This will cause the operating level to be set too high, which may result in excessive distortion. Table 1 lists the correction factors for various tape speeds, and reference frequencies.

NOTE:

Table 1 applies to ATR-100 system heads ONLY.

To use the table, set the PADNET reproduce gain so that the reference level plays back higher than the level expected, by the appropriate amount shown in the table.

Adjust the high frequency equalizer in a normal manner. The low frequency equalizers may be set approximately from the alignment tape, but should be set finally when doing overall record-reproduce alignment.

Sel sync levels may be set in a similar manner to the reproduce levels, but it is recommended they be set from a recording, after all other alignment procedures have been completed. No adjustment of the sel sync equalization should be necessary.

Unless different line output/input level sensitivities are desired from those set in the factory, no adjustments should be made to the output/input system. If different operating line level is desired, e.g., + 8dBm, then four adjustments to each I/O module must be made:

- | | |
|---------------------|----------------|
| 1. Record preset | 3. Record Cal. |
| 2. Reproduce preset | 4. Meter Cal. |

The first three are front panel adjustments and the fourth is an on-board adjustment. Assuming no adjustments have yet been made to the I/O system or basic system, the following method will ensure that the interface level to the basic system is maintained at -5 dBm for operating level.

- a. Using an external VTVM, set the input level at 1 kHz to the new desired operating line level. Select input monitoring. Adjust the record preset to give O-VU indication.
- b. Monitor the line output with a VTVM; the output level should be + 4dBm. Adjust the record calibrate preset to produce the new desired line output level. (The VU meter indication will now be incorrect.)
- c. Turn off power and remove the I/O module from the chassis. Adjust the meter calibration preset R21 in the direction desired (cw increases metering sensitivity).
- d. Replace I/O and recheck meter reading. It will be necessary to repeat step c as required until the VU meter indicates O with the new line output level. If an I/O module extender board assembly is available, R21 may be set directly.
- e. Place the system in record and adjust the reproduce preset on the I/O system for O VU (or, alternatively, set the reproduce preset on the I/O while reproducing an alignment tape). DO NOT adjust any presets on the I/O PWA other than R21.

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Table 1.
Fringing Effect Correction Factors for Full Track Alignment Tapes used on 2-Track
or 4-Track ATR-100 Systems.

SPEED	REFERENCE FREQUENCY	CORRECTION FACTOR*	
		2 TRACK	4 TRACK
30 in/s	500 Hz	+1.61 dB	+2.10 dB
	700 Hz	+1.46 dB	+1.85 dB
	1.0 kHz	+1.29 dB	+1.58 dB
15 in/s	500 Hz	+1.29 dB	+1.58 dB
	700 Hz	+1.14 dB	+1.34 dB
	1.0 kHz	+1.01 dB	+1.13 dB
7.5 in/s	500 Hz	+1.01 dB	+1.13 dB
	700 Hz	+0.90 dB	+0.99 dB
	1.0 kHz	+0.81 dB	+0.87 dB
3.75 in/s	500 Hz	+0.81 dB	+0.87 dB
	700 Hz	+0.74 dB	+0.79 dB
	1.0 kHz	+0.69 dB	+0.74 dB

*2 Track - includes 0.56 dB due to 80 mil reproduce core on 75 mil track.

*4 Track - includes 0.6 dB due to 75 mil reproduce core on 70 mil track.

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2. Record Alignment

The settings of the preset record equalizer (S1) on the PADNET will require adjustment for the new speeds and/or equalization standard being used. S1/1 through S1/3 control the equalization for the high speed, and S1/4 through S1/6 are for the low speed. The schematic for the PADNET (refer to Instruction manual, Cat. No. 4890409) shows the functions of each switch position. The equalization standard to be used will either require a constant current low frequency record characteristic (∞) or a low frequency boost (3180 microseconds, NAB). Therefore, the position of S1/3 or S1/6 will be determined by the equalization standard; e.g. NAB 15 in/s for the low speed will require S1/6 to be set "OFF", while AES 30-in/s equalization will require S1/3 to be set "ON" (thus ∞ = ON and 3180 μ s = OFF for S1/3 or S1/6.)

The other two switches (S1/1, S1/2, or S1/4, S1/5) can be set, in conjunction with the normal record equalizer, in any combination to produce the flattest overall response. For Ampex 456 or 406/407 tape, the following settings are recommended:

Equalization Standard & Speed	S1/1 or S1/4 Shelf Down	S1/2 or S1/5 Shelf Up	S1/3 or S1/6 ∞ /3180
30 in/s AES 17.5/ ∞	OFF	OFF	ON
15 in/s IEC 35/ ∞	OFF	OFF	ON
15 in/s NAB 50/3180	ON	OFF	OFF
7.5 in/s NAB 50/3180	OFF	ON	OFF
7.5 in/s IEC 70/ ∞	OFF	OFF	ON
3.75 in/s IEC/NAB 90/3180	OFF	ON	OFF

If Ampex 456 tape is to be used, and four-speed master bias operation is retained, all bias adjustments may be made using the MASTER bias controls on the audio control board only. If operation with any other type of tape is desired, it may be biased by using the master bias controls only.

For Ampex 456 tape, the recommended biasing point is 2.75 dB \pm 0.25 dB of overbias at 20 kHz for 30 in/s, 10 kHz for 15 in/s, 5 kHz for 7.5 in/s, and 2.5 kHz for 3.75 in/s. If the bias normalizing needs to be readjusted, the master bias bus level should be preset to 2.5V peak-to-peak. This voltage may be verified at pin FF on any audio board or PADNET PWA. With the master bias bus set to 2.5 Vp-p, the individual bias normalize presets may be set.

When Ampex 456 tape is used, each channel should be set for 2.75 dB overbias at the frequency appropriate to the speed. For other types of tape, some other amount of overbias may be appropriate. Each channel must be set for the same level of overbias. It is recommended this be done at some high frequency similar to that recommended for 456 tape.

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For Ampex 406/407 tape, 1.5 to 2.0 dB overbias at 20 kHz for 30 in/s, 10 kHz for 15 in/s, 5 kHz for 7.5 in/s and 2.5 kHz for 3.75 in/s is appropriate for ATR-100 heads.

Record equalization adjustment is straightforward. At 30 in/s and 15 in/s, it may be done at operating level. At 7.5 in/s, it should be aligned at 10 dB below operating level, and at 3.75 in/s at 20 dB below operating level.

Initial setting of the high frequency equalizer can be done at specification band edges; i.e., set 28 kHz at 30 in/s to -1.0 to -1.5 dB, using record equalizer; and 35 Hz at 30 in/s to -1.5 dB, using low frequency reproduce equalizer. Similarly, at other speeds the upper and lower band edges specified can be used to make initial adjustments of the record equalizer and low-frequency reproduce equalizers, respectively. The appropriate frequency range can then be swept with the oscillator and any fine adjustments to equalizers made as required.

At slower speeds, it may be necessary to adjust the record head azimuth to maximize output level at high frequencies before completing equalization adjustments. DO NOT adjust azimuth of either head for phasing until the equalization adjustment for that head is correct; i.e., do reproduce adjustments first, then set reproduce azimuth for phasing, then do biasing and equalization, followed by record azimuth. If this order is not followed, the record or reproduce head azimuth may be mechanically misadjusted to correct an interchannel phasing error which is electrical in origin.

Record gain is adjusted conventionally. It should be noted that when making a permanent change of operating level, all changes preferably should be made at the PADNET.

FIELD ENGINEERING BULLETIN

TITLE: SERVO ALIGNMENT PROCEDURE

DATE OF ISSUE 1/27/77

I. APPLICABILITY

All ATR-100's.

II. PURPOSE

To align capstan and reel servos in the ATR-100 Recorder/Reproducer.

III. DISCUSSION

The ATR-100 servo system is aligned at the factory and should not require adjustment unless any of the LED or sensor PWAs are replaced or disturbed. Removal of the tach PWAs does not generally result in the necessity to readjust the capstan tach if the screw holding the adjustment bar is not disturbed. Adjustment of the capstan servo is usually required if any of the following symptoms are present.

1. Capstan does not stop on command.
2. Capstan does not lock at one or more speeds.
3. Tape timer counts randomly up and down at high speed.
4. Capstan runs away at a high speed.
5. Low speed flutter out of spec.

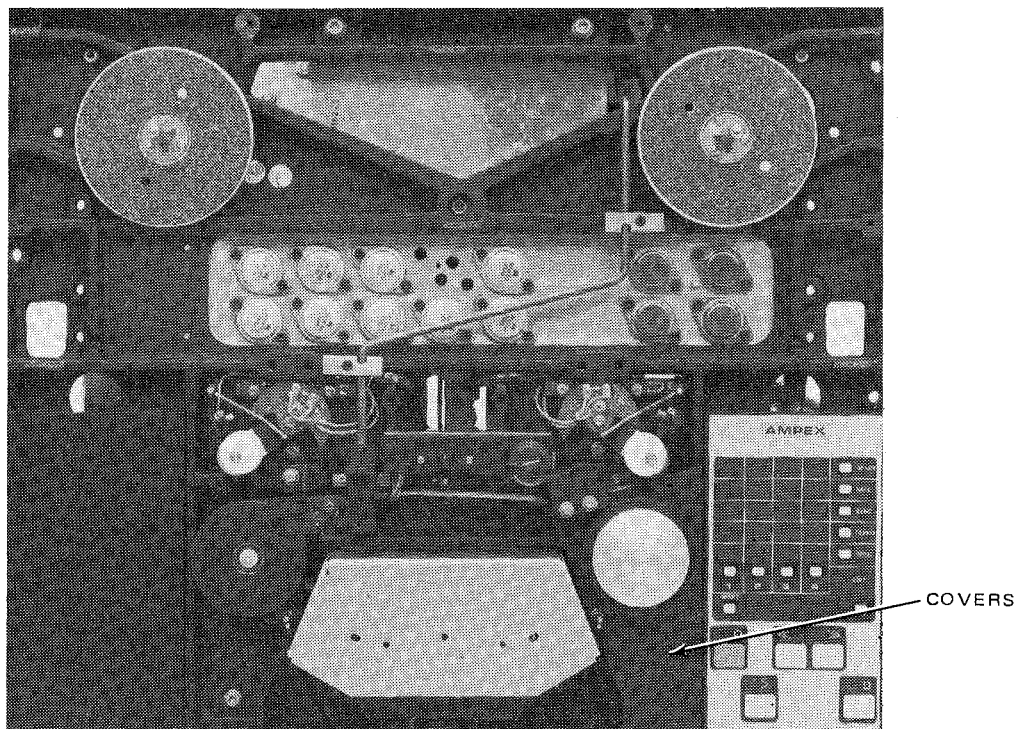
Adjustment of the reel servo is usually required if any of the following symptoms are present.

1. Tape tension incorrect.
2. Tape tension not balanced (capstan coasts unequally forward and reverse).
3. Capstan comes out of lock or fails to lock.
4. ATR-100 does not enter thread mode smoothly.
5. ATR-100 does not stop or does not stop quickly at end of tape.
6. Tape moves in stop mode.
7. Tape moves in play-edit stopped mode.
8. Flutter out of spec.

IV. PROCEDURE**A. Capstan Servo Alignment Procedure**

1. With power off, remove reel servo PWA.
2. Place capstan servo PWA on extender.
3. Remove covers over the front side of the capstan tachometer assembly (refer to Figure 1).
4. Loosen both screws holding tach sensor assembly (refer to Figure 2).

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Figure 1. Front Covers

5. Apply power and place ATR-100 into play mode. If capstan runs away, turn off power and re-apply power. Do the next three steps by manually turning the capstan.
6. Monitor TP5 and TP6 of the capstan servo PWA with dual trace scope (set for chop mode).
7. Move sensor tangentially for maximum indication on scope (refer to Figure 2).
8. Adjust R32 and R50 on the capstan servo PWA for 15Vp-p.

NOTE:

Waveform appearing at TP6 will not be sinusoidal but will have a distortion near the zero crossing. This is due to the hysteresis introduced into one preamplifier.

9. Monitor TP3 and TP4 of the capstan servo PWA.
10. Move tach sensor radially for a 90° phase difference in the two signals (refer to Figure 2).
11. Press stop button. If capstan stops, go to step 13; if capstan runs away, go to step 12.
12. Move tach sensor radially for a 90° phase difference in the opposite direction to that observed in step 10 above.

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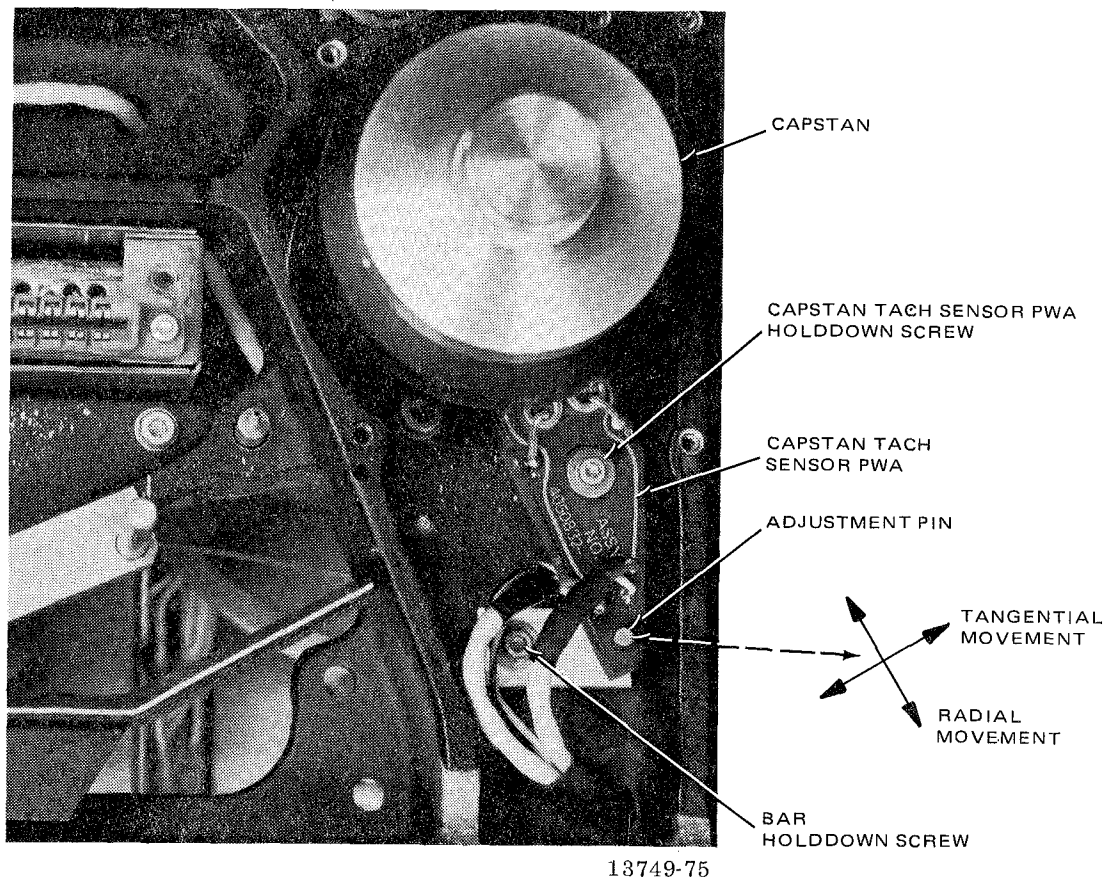


Figure 2. Tach Sensor PWA

13. Place transport in fast forward; observe that phase angle may change, but that it should never reverse or have two transitions of one signal without a transition of the other appearing in between.
14. Press stop button and check that transport stops.
15. Place transport in fast rewind; note that the phase angle should be the same as in step 13 above, but in the opposite direction. Move sensor *slightly* to satisfy this condition.
16. Press stop button and check that transport stops.
17. Place transport in fast forward. While observing scope, tighten first the screw on the bar, then the one on the PWA, noting that the phase does not change appreciably. (Refer to Figure 2.)
18. Test adjustment by placing transport in rewind.

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19. Replace tach covers.

NOTE:

In later production machines, the tach PWAs may be removed and the same ones replaced (required to remove capstan) without disturbing this adjustment as long as the screw on the bar is *not* loosened.

20. Turn off power.

B. Reel Servo Alignment Procedure

1. Return capstan servo PWA to its normal position (in chassis) and place reel servo PWA on extender.
2. Ensure that tape thread microswitches on supply and takeup tension arms can be activated with all overlays in place and secured.
3. Apply power.
4. Monitor TP5 of reel servo PWA with scope.
5. Move both supply and takeup constant tension arms to their mid positions. Indication should be high (+5V).
6. Let either arm go; indication should be low (0V).
7. Repeat for the other arm with the first arm at mid position. Indication should be low (0V).
8. Monitor TP6 of reel servo PWA with scope. Indication should be high (+5V).
9. Move either arm in towards heads. Indication should be low (0V).
10. Repeat for other arm.
11. If logic conditions required in steps 6 through 11 are not met, adjust appropriate LED PWA on tension arm by loosening mounting screw slightly and rotating PWA relative to the tension arm. Retest with overlay in place.
12. Thread tape on the transport and activate servos.
NOTE:
A squealing sound usually results and is of no concern.
13. Advance tape to mid pack (equal tape pack on each reel).
14. Place transport in play at 15 in/s.
15. Measure tension between reproduce head and capstan with a "Tentelometer." If Tentelometer is available, go to step 17; if not, go to step 16.
16. Measure voltage at TP7 of reel servo PWA.
17. Adjust R125 on reel servo PWA for 3.75-oz reading on the Tentelometer (-330 mV on the voltmeter) when using 1/4-inch tape, or a 7.5-oz reading on the Tentelometer (-440 mV on the voltmeter) when using 1/2-inch tape.
18. Press stop button.

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19. Spin edit knob equally in each direction; note that tape should coast approximately equal distances in each direction. Adjust R128 for this condition.
20. Place transport in play edit; then stop. If capstan does not stop, verify steps 17 through 19.
21. Turn off power.
22. Return PWAs to normal position.
23. Apply power.
24. Recheck tensions.
25. Recheck capstan servo lock.

**FIELD ENGINEERING BULLETIN****TITLE:** INPUT/OUTPUT ASSEMBLY
ADJUSTMENT PROCEDURE**I. APPLICABILITY**

All ATR-100's.

II. PURPOSE

To adjust the input/output assembly.

III. DISCUSSION

The procedures for adjusting offset nulls, input and output operating levels, and output level meter calibration are included in this FEB. There is only one procedure for offset null adjustments. There are two optional procedures for record and reproduce level adjustments.

Method 1 requires a clip lead and standard cables.

Method 2 utilizes an accessory, part no. 4020425, I/O level set accessory. This accessory consists of a printed circuit card that plugs into the ATR-100 card cage in place of the audio signal card. It connects the input and output of the I/O module together, and provides a coaxial cable fitted with a GR plug that can be inserted into a meter.

Either method will give equal results, but Method 2 is preferred.

The operating input and output level of the input/output assembly is nominally +4 dBm. Output levels as high as +12 dBm and as low as -25 dBm (variable) or -14 dBm (preset) can be utilized. Input levels in the variable mode can be from +40 dBm to -5 dBm, and in the preset mode they can be from +20 dBm to -1.0 dBm. The input and output level to the ATR-100 is fixed at -5 dBm.

Refer to Figure 1 for control locations and proceed as follows:

CAUTION

DO NOT REMOVE OR INSERT I/O MODULE WITH POWER ON.

IV. PROCEDURES**A. Offset Null Adjustments**

Perform these steps only if repairs have been made or components have been changed on the input/output assembly that may affect circuit operation.

1. With all power to input/output assembly removed, adjust level meter for mechanical "zero" (needle at left-hand dial position), and remove fuse F1.
2. Perform all offset null adjustments with power applied but no line input signal or signal input from the ATR-100.
3. Adjust offset null potentiometer R32 for "zero" indication (same as step 1) on the level meter.

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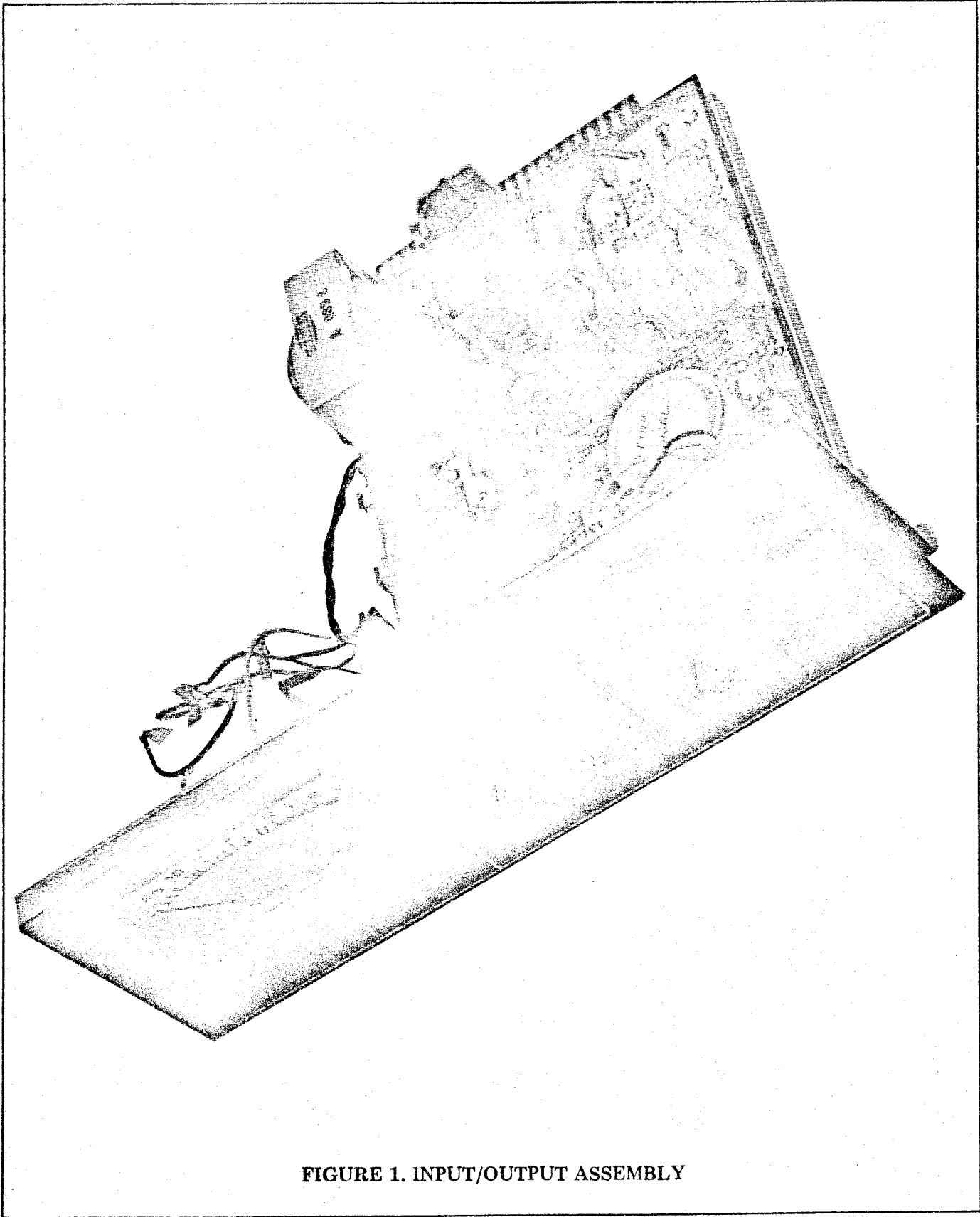


FIGURE 1. INPUT/OUTPUT ASSEMBLY

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4. Connect a dc voltmeter to TP6 and ground.
5. Set RECORD MANUAL/PRESET switch to MANUAL position.
6. Adjust offset null potentiometer R55 for zero change in voltage at TP6 while rotating RECORD potentiometer through its range.
7. Connect dc voltmeter to TP2, and ground.
8. Adjust null potentiometer R40 for 0 ± 30 mV at TP2 (use a non-metallic screw driver).
9. Remove power and re-install F1.
10. Adjust offset null potentiometer R32 for "zero" indication (same as step 1) on the level meter.

B. Method 1. Record Level Adjustments

1. Connect an audio oscillator to the line connector and set frequencies to 1.0 kHz and the output level to the +4 dBm (or other operating level selected by the user).
2. Connect VTVM to TP6 and ground.
3. Set RECORD MANUAL/PRESET switch to PRESET.
4. Adjust record preset potentiometer R2 for -5 dBm level at TP6.
5. Connect VTVM to the line output connector and terminate line output with 600 ohms, or utilize the line termination switch on the rear chassis apron of the I/O module.
6. Place ATR-100 in input mode.
7. Adjust record calibrate potentiometer R3 to +4 dBm (or other line output operating level selected by the user).
8. With power removed, set peak/VU meter switch S3 to VU position. Re-apply power.
9. Adjust meter calibration potentiometer R21 for O-VU indication on the level meter. (If the peak/VU meter switch S3 is in the VU position and R21 is set for O VU at operating level, then the peak position will indicate -6; i.e. peak and VU differ by 6 dB).

NOTE

Perform the following procedure ONLY after the record level adjustments have been done.

C. Method 1. Reproduce Level Adjustments

1. Connect a jumper from TP5 to TP6.
2. Remove all audio cards from the ATR-100.

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3. Connect an audio oscillator to the line input and set the frequency to 1 kHz and output level to +4 dBm (or other operating level selected by the user). Output level must be the same level selected in the record level adjustment.
4. Set REPRODUCE MANUAL/PRESET switch S1 to PRESET.
5. Connect VTVM to the line output connector and terminate line output with 600 ohms, or utilize the line termination switch on the rear chassis apron of the I/O module.
6. Adjust reproduce preset potentiometer R1 for +4-dBm level (or other line output operating level selected by the user).

D. Method 2. Record and Reproduce Level Adjustments

1. Remove all audio cards from the ATR-100.
2. On the ATR-100, insert extender card into the channel which is to be set up.
3. Insert the I/O module level set accessory, part no. 4030425, into the extender card and connect its output to a VTVM.
4. Connect an audio oscillator to the line input connector and set the frequency to 1 kHz and the output level to +4 dBm (or other operating level selected by the user).
5. Place the RECORD MANUAL/PRESET switch in the PRESET position and adjust the preset level control for -5 dBm on the VTVM connected to the I/O level set accessory.
6. Connect a VTVM to the line output and terminate line output with 600 ohms, or utilize the line termination switch on the rear chassis apron of the I/O module. Place the ATR-100 in the input mode.
7. Adjust the record cal control for + 4 dBm-output level (or other operating level selected by the user).
8. Place the ATR-100 in the reproduce mode and the REPRODUCE MANUAL/PRESET switch in the PRESET position.
9. Adjust the reproduce control for a +4 dBm-line output level (or other operating level selected by the user).
10. With power removed, set peak/VU meter switch S3 to VU position. Re-apply power.
11. Adjust meter calibration potentiometer R21 for O-VU indication on the level meter. (If the peak/VU meter switch S3 is in the VU position and R21 is set for O VU at operating level, then the peak position will indicate -6; i.e. peak and VU differ by 6 dB).
12. Repeat the above procedure for the remaining channels.

FIELD ENGINEERING BULLETIN

TITLE: ATR-100 CAPSTAN SERVO INTERCHANGE KIT

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I. APPLICABILITY

All ATR-100's with the early version capstan servo PWA P/N 4050776-XX and the capstan tach LED PWA P/N 4050833-XX.

II. PURPOSE

Kit No. 4020441 includes a new capstan servo PWA P/N 4050860-XX and a new capstan tach LED PWA P/N 4050862-XX. Both assemblies when installed together will result in improved low speed flutter, better servo lockup reliability and quicker deceleration times when entering play from a fast mode.

III. DISCUSSION

Kit No. 4020441-01 must be installed as a pair, i.e. both the new capstan servo PWA and the new capstan tach LED PWA must be installed together to achieve optimum results from the transport. When a 4050776-XX capstan servo PWA is ordered, the new kit will automatically be shipped instead.

IV. PARTS LIST AND TOOLS REQUIRED

1 each	4050860-01	Capstan Servo PWA
1 each	4050862-01	Capstan Tach LED
1 each		3/32 inch Allen Wrench
1 each		1/16 inch Allen Wrench
1 each		Schematic 4840435
1 each		Drawing 4050860

No special tools are required. All of the above PWA's, drawings and schematics are supplied in the kit.

FIELD ENGINEERING BULLETIN

TITLE: TAPE TIMER READOUT MALFUNCTION

I. APPLICABILITY

All ATR-100's

II. PURPOSE

Some ATR-100's when threaded up, or when the edit switch is pressed to take the machine out of stop edit mode will scramble the tape timer display reading. The following modification will prevent this from occurring.

III. DISCUSSION

Switching transients caused by the energizing or de-energizing of relay K-1 in the power supply may cause the "scrambling" of the tape timer display. These transients are coupled into the 432 kHz master clock line which affects the readout. No method of shielding or preventing the transients from entering the master clock has been found; however, slightly integrating the master clock by means of a small 220 pF, 5%, 500V mica capacitor in the transport control board (board 7) effectively filters out the disturbance and stabilizes the readout.

IV. PARTS LIST - TOOLS REQUIRED

1 ea. capacitor 220pF, 5% mica, 500V P/N 034-240

Common technicians' hand tools are required.

V. PROCEDURE

Remove the transport control PWA (board 7) and remove the 4 cap screws which hold the shield assembly to the PWA. Turn the PWA over with the etched circuit side up. Locate and identify A-33 pins 8 and 9. Solder the capacitor to these leads. Dress the capacitor as close to the PWA as possible. Re-assemble the PWA to the shield and re-install in the electronic chassis and verify tape timer readout operation.

FIELD ENGINEERING BULLETIN

REF. NO. 70193

MODEL ATR-100

PAGE 1 OF 3

SUPERSEDES

TITLE: RECORDING AND REPRODUCING SMPTE TIME CODE

DATE OF ISSUE 1/78

I. APPLICABILITY

ATR-100 - All versions

II. PURPOSE

The ATR-100 will play back time code quite satisfactorily at normal speeds, with no modification to the normal equalization. If, however, it is desired to read code during fast wind modes then the audio channel chosen must be "wide-banded".

III. DISCUSSION

There are basically two levels of wide-banding possible.

1. The First Method:

The first method, which only involves re-setting equalizers, and a change to one component value, permits recording of motion direction invariant code, and reproduction of code at, up to 30 times real time speeds, for 15 in/s recordings, and approximately 20-25 times real time for 7.5 in/s recordings. 30 in/s recordings can be adequately reproduced up to full wind speeds.

This method does not permit using the sel sync mode for high speed code reading.

2. The Second Method:

The second method involves changing a number of components on the main audio board, and also re-adjustment of equalizers. The record section re-adjustments are the same as in #1 above. With this second method it becomes possible to read a 15 in/s recording, in either "repro" or "Sel sync" at up to 45 x real time. This is typically faster than the normal fastwind speeds on an ATR-100.

A 7.5 in/s recording may be run at up to 40 x real time but 35 x is recommended as an upper limit.

FIELD ENGINEERING BULLETIN

TITLE: RECORDING AND REPRODUCING SMPTE TIME CODE

III. DISCUSSION (CONTINUED)Method 1:

1. Select normal speed jumpering on Padnet.
2. Set S1 on the Padnet so that S1-3 and S1-6 are "on" and S1-1, S1-2 and S1-4, S1-5 "off".
3. Turn both high speed and low speed record equalizers fully CCW.
4. Put both high speed and low speed reproduce HF equalizers fully CCW.
5. Set both high speed and low speed reproduce LF equalizers fully CW.
6. On the main audio board, locate and remove C9. Replace with a 5 pF $\pm 1/2$ pF mica capacitor (Ampex Part No. 034-156).
7. If a flux loop is available connect it to a square wave generator set to 10KHZ, clip it to the reproduce head, and with the appropriate audio board assembly on an extender, adjust R34 on the main audio board to produce minimum ringing and overshoot. (This adjustment is also correct for normal usage.) If an Ampex flux loop equalizer amplifier is being used, set the HF transition to "0", LF transition to " ∞ " and the SGR to the position appropriate to the transport speed.
8. It is also recommended that the scrape flutter idler in the head assembly be either removed or backed out of contact with the tape; failure to do this may considerably shorten the life of the idler.

Method 2:

1. On the main audio board to be modified remove and/or replace the components noted below:
 - a. R35 was 100 ohm, Remove.
 - b. R36 was 15k ohm, Replace with 3k ohm 1/4W, 5% (Ampex Part No. 066-667).
 - c. R31 was 1k ohm, Replace with 3k ohm, 1/4W, 5% (Ampex Part No. 066-667).
 - d. R9 was 59k, Replace with 22k ohm, 1/4W, 5% (Ampex Part No. 066-712).

III. DISCUSSION (CONTINUED)

- e. L1 was 4700 uH, Replace with 2200 uH, 10%, (Ampex Part No. 540-068).
 - f. C3 was 270 pF, Replace with 1K ohm, 1/4W, 5% (Ampex Part No. 066-665).
 - g. C9 was 39 pF, Replace with 5 pF \pm 1/2 pF (Ampex Part No. 034-156).
 - h. R38 was 100 ohm, Remove.
 - i. C29 was 820 pF, Remove.
 - j. R33 was 27K ohm, Replace with 3K ohm, 1/4W, 5% (Ampex Part No. 066-667).
2. Perform steps 1 through 3 of Method 1 above, Then:
- a. Turn R34 fully CW.
 - b. Turn reproduce high speed and low speed LF Eq. fully CW.
 - c. Connect a flux loop to reproduce head and with 3KHz square wave drive adjust high speed frequency reproduce equalizer for "Flat Top" square wave system output.
 - d. Repeat for lower selected speed with low speed repro HF equalizer.
3. Finally, make a short test recording using a SMPTE code generator, rewind tape and then manually move the tape in both forward and reverse directions. The waveform of the reproduced signals should be essentially similar (i.e. a time reversed signal with no amplitude differences). If desired, the record equalizer may be used to improve the amplitude response for 7.5 in/s recordings, but care must be taken to ensure that no amplitude changes occur with motion reversal.
- IV. To minimize crosstalk into audio tracks from time code. The record and reproduce gains on the time code track can be adjusted to record the time code at 10-15 dB below normal operating level.

FIELD ENGINEERING BULLETIN

TITLE: OCCASIONAL UNTHREADING OF SERVO SYSTEM
FROM FAST TO PLAY MODE

I. APPLICABILITY

ATR-100 Capstan Servo PWA's with Q20, 21, and 22.
P/N 4050776-xx and the early version 4050860-xx.

II. PURPOSE

This modification will eliminate the problem of the servo's unthreading when going from fast mode to play.

III. DISCUSSION

The unthreading of the servo's from the fast mode to play is most prevalent on one half inch machines using 14-inch reels, although other configurations may also experience this problem. This modification is recommended for all configurations.

IV. PARTS LIST AND TOOLS REQUIRED

As required, small gauge insulated wire or bus wire with tubing.

Soldering iron.

Common technicians hand tools.

V. PROCEDURE**A) PWB 4500255-XX (Fig. I)**

Remove the PWA from the shield. On the circuit side of the board, along side Pin 28, is the P/N 4500255-XX. Just below this is the issue letter of the board. Issue letters H and J only should be modified.

Locate the short trace connecting R94 to A14-3. (See fig. I). Cut trace per dwg. and install short insulated jumper from R94 to A13-6. Re-install PWA onto shield and check for proper operation of the capstan servo. No re-adjustment of the servo system is necessary.

B) PWB 4500298-XX (Fig. II)

Remove the PWA from the shield. On the circuit side of the board along side Pin 28, is the P/N 4500298-XX. Just below this is the issue letter of the board. Issue letters A thru D need to be modified. Issue letters E and later have had the circuitry changed, and do not require this modification.

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AUDIO DIVISION****FIELD ENGINEERING BULLETIN**

REF. NO. 70198

MODEL ATR-100

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TITLE: OCCASIONAL UNTHREADING OF SERVO SYSTEM FROM
FAST TO PLAY MODE

V. B) Cont'd

Locate the trace connecting R94 to A14-3 (see fig. II)
Cut trace in two places per drawing and install a short
insulated jumper bridging the pad that R94 is soldered
to. With a longer insulated jumper connect from the R94
pad to A13-6 per drawing. Re-install PWA onto shield
and check for proper operation of the capstan servo.
No re-adjustment of the servo system is necessary.

This completes the modification.

FIELD ENGINEERING BULLETIN

TITLE: OCCASIONAL UNTHREADING OF SERVO
SYSTEM FROM FAST TO STOP MODE

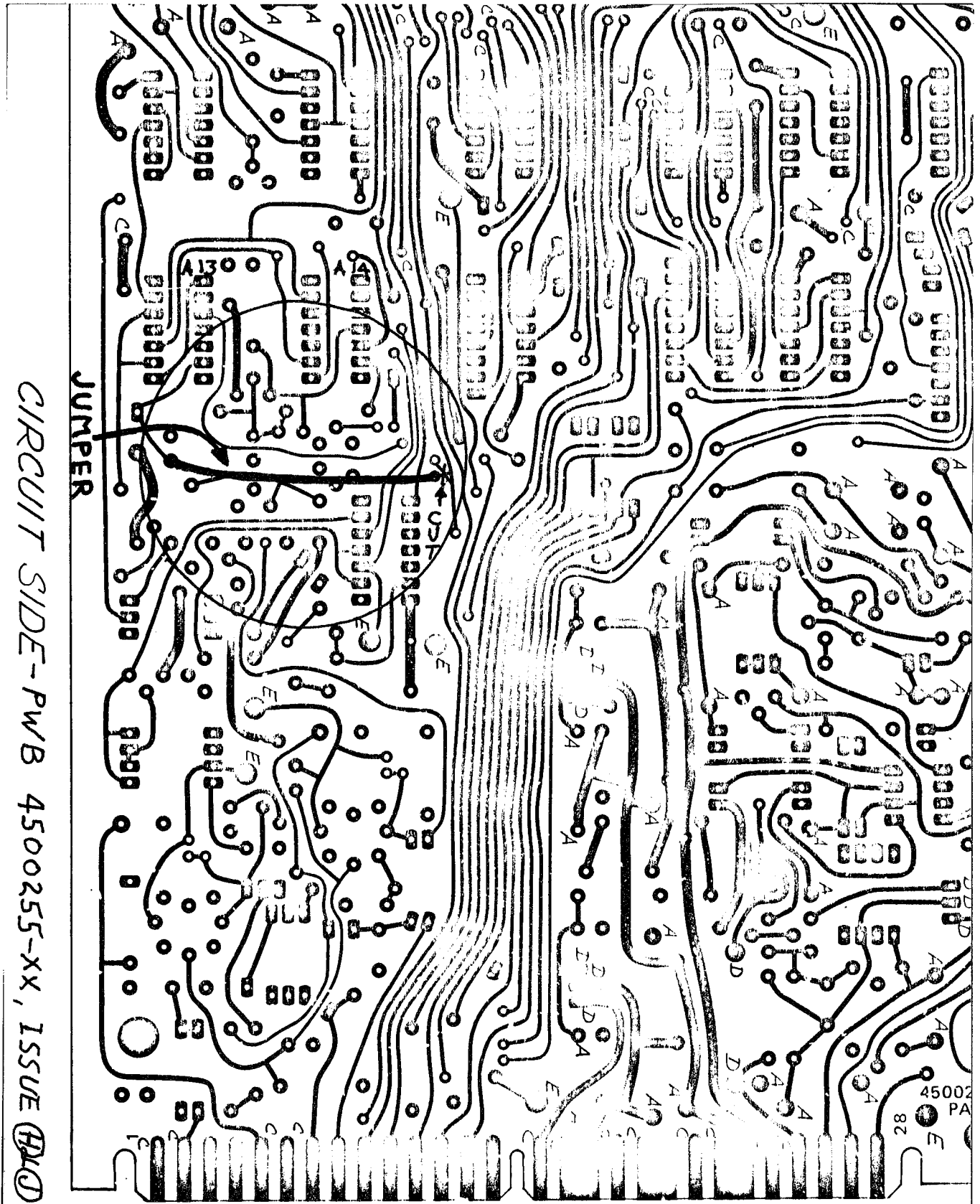


FIG I

FIELD ENGINEERING BULLETIN

TITLE: OCCASIONAL UNTHREADING OF SERVO SYSTEM
FROM FAST TO PLAY MODE

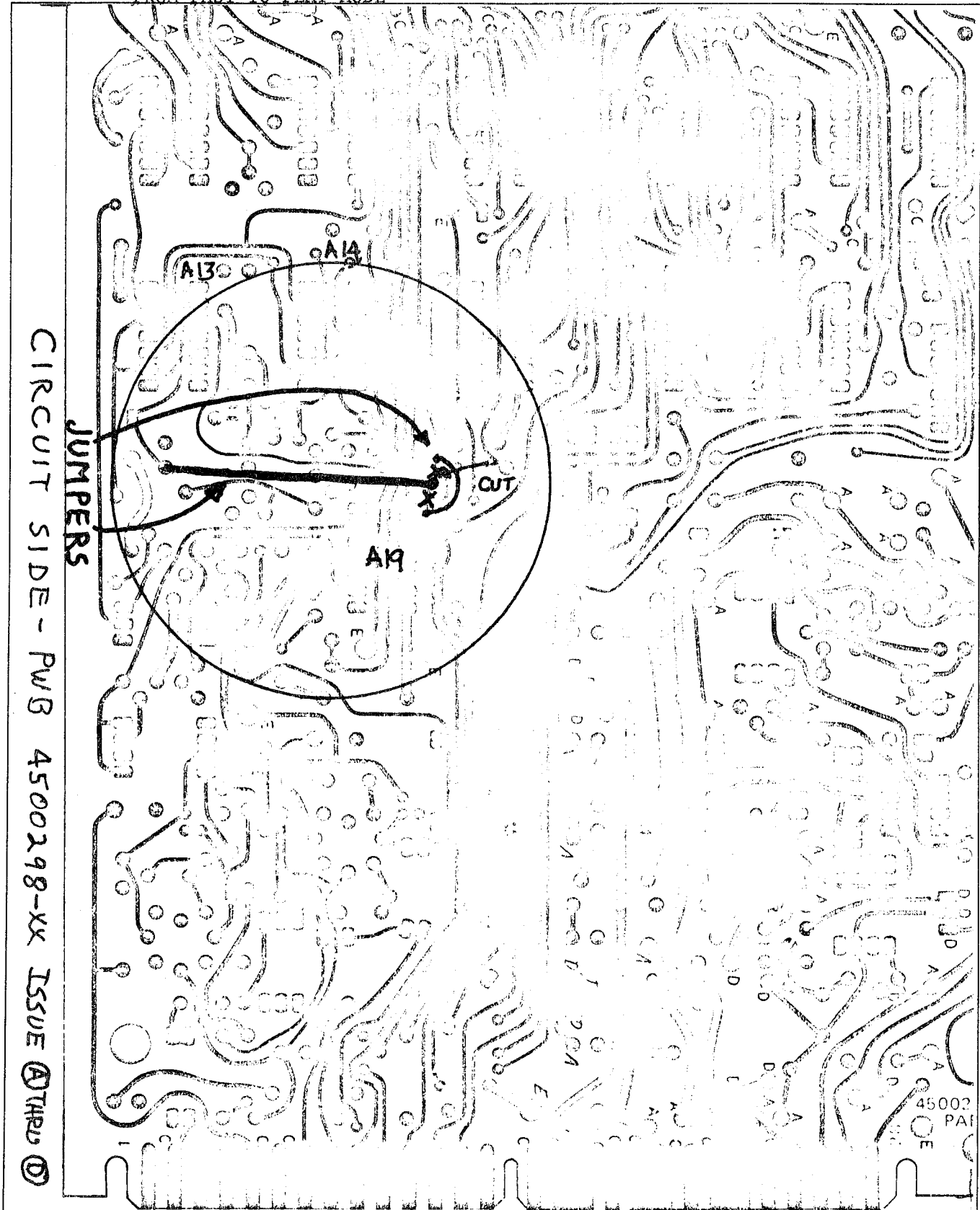


FIG II

TITLE: INPUT/OUTPUT MODULE FUSE BLOWING

I. APPLICABILITY

ATR-100 - All versions

II. PURPOSE

This modification eliminates the random blowing of F1 on the input/output module.

III. DISCUSSION

The fuse F1 in the input/output module which is presently rated at 0.5 amps, is designed to protect the line output transistors Q4 and Q5 from internal and external transients. Occasionally this fuse will blow without apparent reason. The following modification will prevent this occurrence and still effectively protect the circuit.

IV. PROCEDURE

1. In the input/output module, Ampex Part No. 4050827-xx, replace R49 and R50 with a 10 ohm, 3 Watt, 5% wire-wound resistor (Ampex Part No. 059-631) stood off from the board slightly.
2. Replace fuse F1 on the input/output module with a 0.750 A-FB, Ampex Part No. 070-031.
3. On each main audio PWA remove the plug in "Padnet" PWA Part No. 4050755-xx and replace R42 with a 470K, 1/4 Watt, 5% resistor (Ampex Part No. 066-652).

This completes the modification.

TITLE: REDUCTION OF TRANSIENTS DURING WAKE-UP

I. APPLICABILITY

ATR-100 - All versions

II. PURPOSE

To reduce transients generated when the wake-up line comes on.

III. DISCUSSION

When AC power is applied to the machine there is a 3 to 5 second pause before the wake-up line comes on. When the wake-up line goes high, a transient is generated that can peg the VU meter. This modification should also reduce the power-up and power-down transients.

IV. PARTS AND TOOLS NEEDED

1 each Resistor, 220 ohm, 1/4W, 5%, Comp. (P/N 066-663)

1 each Resistor, 510 ohm, 1/4W, 5%, Comp. (P/N 066-664)

1 each Capacitor, 47 MFD, 6V, Tantalum (P/N 037-298)

Soldering Iron

Common Technicians Hand Tools

V. PROCEDURE

On the audio control PWA (Bd. No. 5), Part No. 4050788-xx, remove the four screws that secure the PWA to the shield. Locate and identify R11 located between A5 and A6. Remove the 1K resistor and replace with a 510 ohm resistor. Turn the board over and on the circuit side locate the circuit for A5 and A6. The two traces from pins 12 and 13 of A5 go to the pads for R11, 12 and 13. Install a 220 ohm resistor across pins 12 and 13 of A5 at these pads, keeping the leads as short as possible (see attached drawing).

On the transport logic PWA (Bd. No. 7), Part No. 4050787-xx, remove the four screws securing the shield and locate C12 adjacent to Q2. Replace with a 47 MFD, 6V tantalum capacitor.

This completes the modification.

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AUDIO DIVISION****FIELD ENGINEERING BULLETIN**

REF. NO. 70199

MODEL ATR-100

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SUPERSEDES

DATE OF ISSUE 2/78

TITLE: FAILURE OF F2 ON DC SUPPLY WHEN ACCESSORY
IS USEDI. APPLICABILITY

ATR-100 all versions.

II. PURPOSE

F2 on the DC supply will blow when some accessories are used.

III. DISCUSSION

Due to increased current demands from the DC supply, fuse F2 which protects the +5VDC regulated supply should be changed. When an accessory such as the multipoint search to cue is used, the fuse often blows. If an accessory is used on the ATR-100, then a change must be made to the DC supply.

IV. PARTS LIST

1 each 5 amp fast-blow 250V fuse, P/N 070-072.

V. PROCEDURE

Remove F2 (3A-FB-250V) from the DC supply and replace with a 5 amp-FB-250V.

FIELD ENGINEERING BULLETIN

TITLE: SHUT DOWN OF +20V DC SUPPLY TO AUDIO CIRCUITS

I. APPLICABILITY

ATR-100 -All versions- 4 track most affected.

II. PURPOSE

Due to a tolerance build-up in the +20V DC circuitry, the filtered +20V DC may shutdown during load conditions. A simple modification will prevent this.

III. DISCUSSION

The 4 track version is affected to a much greater degree because of the extra two channels of audio, however, all versions of the ATR should be modified.

IV. PARTS LIST & TOOLS REQUIRED

2 each Resistors, 30K, 1/4W. 5% COMP. - P/N 066-846

Common technicians hand tools.

V. PROCEDURE

Remove the bottom cover to the DC supply exposing the dynamic brake PWA P/N 4050794-02. (The newer version PWA P/N 4050882-xx does not need this modification). Remove the three screws holding the PWA in place and locate R4 and R12 which are 10K ohm. Remove both 10K ohm resistors and install the two 30K ohm resistors. This modification will assure that the current capacity of the +20V DC line is 4 amps.

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MODEL ATR-100

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SUPERSEDES

DATE OF ISSUE 2/78

TITLE: Erase/Bias-Ramp Timing Changes Due
to Capacitor LeakageI. APPLICABILITY

Main audio PWA P/N 4050754-01 thru -09.

II. PURPOSE

The main audio PWA's presently use 4 each "green" Varadyne capacitors in C18, 38, 41 and 43. There has been several cases of failure due to leakage.

III. DISCUSSION

The failure of C38 or C41 will cause the erase circuit to come on. The I/O module confidence lites will also illuminate. A substitute capacitor manufactured by "Erie" and colored red has been found to be very reliable. Effective with PWA 4050754-10 all four capacitors will be the new "Erie" vendor.

IV. PARTS LISTS AND TOOLS REQUIRED

4 each capacitors, ceramic-monolithic 0.22MF, 10%, 50V. (Red color) (Ampex P/N 064-567.)

Common Technicians hand tools required.

V. PROCEDURE

On the main audio PWA P/N 4050754-01 thru -09, remove the padnet and main audio PWA. On the main audio PWA only locate the 4 green "Varadyne" capacitors at C18, 38, 41 and 43. Remove and replace with 4 each "Erie" capacitors. No re-alignment of the PWA is necessary.

This completes the modification.

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