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Instruction

Manual

FL-110

FL-110 LINEAR AMPLIFIER



GENERAL

The FL-110 is an all solid state linear amplifier designed to match the FT-301S and FT-7 transceivers covering ham hands 160 through 10 meters.

The FL-110 uses a pair of SRF-1427 transistors in a push-pull, broad-band linear amplifier circuit configuration with negative feedback reducing the distortion and sourious radiation.

The Automatic Level Control Gircuit controls the exciter gain to allow the highest average power without distortion caused by peak clipping, and, protects the PA transistor from destruction due to overdrive.

An internal change-over relay is operated automatically by either a transmitted signal or PTT switch in the exciter.

CAUTION

DO NOT EXCEED RATED DRIVE POWER OR DESTRUCTION OF THE PA TRANSISTOR MAY RESULT.

- 2 -

SPECIFICATIONS

Circuit

Frequency Coverage

Wave Form

Max. Drive Power

input Impedance

Dutput Impedance

Max. Input Power

Distortion

Spurious Radiation

Power Requirement

Size

Weight

Transistorized push-pull, wide-band linear amplifier.

Ham bands 160 through 10 meters.

SSB, AM, CW and FSK

15 watts CW, SSB 4 watts AM, FSK

50 ohms unbalanced

50 ohms unbalanced

200 watts DC SSB, CW 75 watts DC FSK 50 watts DC AM

Better than 31 db

Less than -40 db

13.5V DC ±10% negative ground Receive 0.05 amps Transmit 17 amps at 100 watts Output 14 MHz

120(W) x 100(H) x 200(D) m/m

2.5 kg

SEMICONDUCTOR COMPLEMENT

IC	"PC271C	(1)	DIODE	1S-1007	(12)
TR	2SC372Y 2SC735Y 2SD235 SRF1427	(1) (1) (1) (2)		10D1 10D10 SG103D SR103D	(3) (2) (1) (2)

"CAUTION"

EXCEEDING CURRENT LEVEL AS LISTED IN OPERATING MANUAL MAY CAUSE SPURIOUS IN VIOLATION OF FCC RULE 97,73,

CONTROLS, INDICATORS & CONNECTORS





Front Pane	

(1)	POWER		Switch to turn power 'ON'.
(2)	DELAY		Switch selects relay hold time for carrier operated change-over. Relay time is 0.1 - 0.2 seconds for FAST and 0.3 - 1.0 seconds for SLOW positions.
(3)	BAND	~	Switch selects the Amateur band between 160 and 10 meters.
	INDICATORS		
(4) (5) (6)	REC: OPER: AFP:	i	Green lamp indicates receive mode. Red lamp indicates transmit mode. Red lamp indicates that the AFP circuit is in operation and that the linear amp is shut down.
		Rear Panel	
(7)	INPUT		Input connector for the drive from exciter.
(8)	ANT	-	Antenna connector.
(9)	POWER		DC-13.5V, 20A power input. External PTT control terminal is included.
(10)	PIT	-	Switch to select relay polarity.
(11)	GND		Ground connection.

INSTALLATION AND OPERATION

The FL-110 Linear Amplifier is installed and operated very simply. It requires only a 13.5 volts DC power source and an antenna. However, the following points are very important, therefore, please read them carefully before installing and operating the FL-110.

CAUTION

PERMANENT DAMAGE WILL RESULT IF THE WRONG POLARITY OF DC POWER VOLTAGE IS APPLIED TO THE F1-110. OUR WARRANTY DOES NOT COVER THE DAMAGE WHICH WOULD RESULT TO THE AMPLIFIER IF THE INCORRECT POLARITY WAS APPLIED.

The FL-110 will operate satisfactorily from any 12 - 14 volts DC power source having a 20A current capacity. When making connections to the power source, be certain the the ORANGE lead is connected to the positive (+) and the BLACK lead to the negative (-).

The power cable should be as short as possible to minimize voltage drop and to provide a low impedance path from the FL-110 to the power supply.

Prior to operating the TL-110 in a mobile installation, the automobile of voltages regulator setting should be checked. In many vahiles, the voltage regulator is very poor and, in some cases, the regulator may be adjusted for an excessively high charging voltage. It is necessary to carefully set the regulator so that the highest charging voltage does not exceed 14 volts.

No special installing precutions need be observed if slequate venilation space is available. However, it is recommended that excessively warm locations, such as cars heater ducts, should be avoided. The TL-110 should be installed in such a way so that the beat sink is on too.

It is also very important that the antenna used with the FL-110 presents a fairly close 50 ohms non-reactive load. If the SWR is as high as 2:1, the output power decreases and the AFP circuit will work with SWR 3:1 to protect the power transitor. The FL-110 can be keved either manually or automatically.

For manual operation, use the accessory relay output of the transceiver in use as illustrated in Fig. 1. With this interconnection, the FL-110 is keyed by push-to-raik operation of the transceiver.

Carefully examine the relay function of the transceiver.

The switch marked PTT on the rear panel should be set to (-) for the transactiver which has the accessory relay contact close to ground in transmit [T-10] series]. It should be set to (+) position for the transpectiver which has the relay contact close to a positive voltage in transmit [T-30] series].

Use a coax cable for the connection between the transceiver and the FL-110 linear amplifier.

CAUTION

THE DRIVING POWER SHOULD NOT EXCEED 15 WATTS UNDER ANY CIRCUMSTANCES.

DO NOT KEY THE FL-110 WITHOUT THE PROPER ANTENNA BEING CONNECTED.

THE COLLECTOR OF THE PA TRANSISTOR IS CONNECTED TO THE FOWER SOURCE AND DRAWS S MILLIAMPS WHEN THE POWER SWITCH IS AT "OFF" POSITION. THEREFORE, IT IS RECOMMENDED TO DESCONNECT FOWER CALLE FROM THE BATTERY WHEN THE FL-110 IS NOT BEING USED FOR SEVERAL MONTHS.



Figure 1

Figure 2

When the power switch is set to "OFF" position, the FL-110 does not operate and the antenna is directly connected to the transceiver. When the power switch lie "ON", a green lamp lights up and the FL-110 is keyed together with the transceiver. On transmit, a red lamp lights up.

The FL-110 can operate automatically when the transcriver is operated by VOZ (voice controlled) mode. The remaining the transmitter control from the transcriver controls the change-over relay in the FL-110 to The relay hold time is set to either FAST or SLOW to select delay time of the change-over relay. When the TL-110 to perated with the lower driving power of lease than J watt, the carrier operated change-over circuit does not function.

CAUTION

IF THE AFP (AUTOMATIC FINAL PROTECTION) CIRCUIT STARTS TO WORK, A RED WARNING LAMP LICHTS UP SHOWING THAT THE LINEAR AMPLIFIER IS NOT FUNCTIONING.

IF THIS HAPPENS, TURN THE POWER SWITCH "OFF" AND CHECK FOR THE CAUSE OF TROUBLE WHICH WILL BE EITHER A DEFECTIVE ANTENNA SYSTEM OR OVERDRIVE FROM THE EXCITER.

AFTER ELIMINATING THE PROBLEM, THE AFP CIRCUIT CAN BE RESET BY TURNING THE POWER SWITCH "ON",

CIRCUIT DESCRIPTION

The FL-110 consists of four major parts -- COUPLING UNIT, CONTROL UNIT, BOOSTER UNIT and LPF unit. On receive mode, a received signal is fed through J1, RL1 and J2 to the transceiver antenna terminal.

On transmit, the output signal from the transceiver antenne passes through the CM coupler T101 in the coupler unit PR-1680 where the RF voltage is detacted and applied to the control unit PB-1681 in order to activate the relay RL1.

A forwarding wave is detected by the voltage doubler rectifier D(0) and D(0), 15:007 and a reflected wave is detected by D(0) and D(04, 15:007. The rectified DC voltages are applied to a comparison CQM, apC-371C which controls relay driver, and a strain of the strain of the strain of the strain of the effective of the strain of the strain of the strain driver circuit dees not function.

A part of the DC voltage obtained from the forwarding wave is applied to the AFP directli in order to operate RL201 to disconnect the activating voltage for RL1 thus protecting the PA transistors from damage due to overdrive. The relay hold time is set to either FAST or SLOW by adding C201 for a longer discharge time.

When RL1 is activated, the bias voltage is applied to the PA transistors and the amplifier starts to operate.

The driving power is fad through the equalizer circuit consisting of R1210, R1211, G1201, G1202, R1201, R1202 and L1201 to the input transformer T1201 to be amplified by Q1201 and Q1202, SRF-1427 which works as a wide-band linear amplified in a puth-pull configuration.

The Negative Feedback circuit consisting of R1206, L1206, R1204 and L1203 improves the stability and the linearity of the PA stage.

The 13.5 Volt DC voltage is regulated to 0.65 volts by a regulator Q1203, 25D235 to be used as bias for Q1201 and Q1202, Q1203 is controlled by the voltage generated by D1201 and D1202, 10010 which warks in accordance with the temperature of the final transistor in order to protect the final transistor.

The amplified output is fed through the Low-Pass Filter Unit, PB-1577 which reduces the harmonic radiation, and then passes through relay RL1 to the antenna.

A partion of the output power is coupled through T301 to the AFP circuit.

The DC voltage obtained by rectifying the forwarding power with D302 and D304, 15-1007 is fad to Q203, CW01B which controls RL201 to open RL1 when the output power exceeds prease value set by VR301.

The DC voltage obtained by a reflected power caused by high VSWR (more than 1:3) also controls Q203 to open RL1.

MAINTENANCE AND ALIGNMENT

Your FL-110 Linear Amplifier has been carefully aligned and seated at our factory prior to shipment. The reliability of the solid state devices used in the FL-110 should provide parse of trouble-free service if the amplifier is not abused, and, normal routime maintenance ic carried out.

The following precautions should be observed to prevent damage to the FL-110.

- (a) Do not exceed 14 Voits DC at the power receptede. When operating mobile, check the battery voltage under load (full output on CW) with the engine running fast enough so that the ear animeter shows a "charge". Also, do not operate the FL-110 if the supply voltage is below 12 Voits DC.
 - (b) Avoid direct exposure to sunshine or water.
- (d) Avoid extremely warm locations and maintain free air circulation around the heat sink.

The FL-110 does not require realignment with normal usage. Service, or replacement of a major component, may require subsequent realignment.



REALIGNMENT PROCEDURE

DELAY ADJUSTMENT (VR201)

The relay hold time can be adjusted by VR201. Clockwise rotation of VR201 will produce longer hold time.

(2) BALANCE ADJUSTMENT OF CM COUPLER (TC101, TC301)

Set the power switch to "OFF". Connect dummy lead/waitmeter, YP-150, to antenna connector. Set the output power of the exciter to 10 waits on the 3.5 MHz band. Connect a TVM between a check point marked "R" in the control unit (+) and ground (-). Adjust TC(101 for a minimum TVTW reading lease than 0.05VI.

Connect plus (+) lead of VTVM to TP301 in the LPF unit. Set the power switch to "ON". Adjust TC301 for a minimum VTVM reading (less than 0.1 volts).

(3) AFP CIRCUIT ADJUSTMENT (VR202, VR203, VR301)

Prior to this adjustment, complete the adjustment of CM coupler described in Step (2).

Set VI202 to a fully decovires position and VI203 to a fully contain-indevises position in the contra tunk. Set VI203 in the contain-indevises position in the contra tunk. Set VI203 in the position of the set of the set of the set of the set of the load variances of the set of the set of the set of the set of the 20 will set erise regime in the set of the set o



Repeat this procedure until the AFP circuit works without fail with a 20 watts input and does not work with a 15 watts input.

Them, rostew VE301 in a counter-clockwise direction until the APP circuit is activated. Slowly notate bw VE301 back approximately 5 degrees in a clockwise direction. Set the acciter to receive. Connect VSWR meter, anterna coupler and dummy load/mattneter in the antenna competer to produce VSWR 151 at 120 works output adaptated interaction coupler to produce VSWR 151 at 120 works output Slowly notate VE205 in a clockwise direction until the AFP circuit is activated.

(4) CARRIER CONTROL CIRCUIT ADJUSTMENT (VR101)

After completion of above procedure, disconnect the PTT connection between the exciter and FL-10. Set VR101 to a fully clockwise pestion. Turn the power switch "ON" and apply 1.5 MHz 10 wattor CW signal from the exciter. Carefully rotate VR101 in a constar-clockwise direction until the relax is activated. Recover the PTT connection.

(5) PA BIAS ADJUSTMENT (VR1201)

This adjustment is only required when the PA power transistors are replaced. Otherwise, please do not adjust the VR1201 as an incorrect setting will result in damage to the PA transistors.

Connect IA ammeter in the power supply line (cut red wire) to measure PA collector idd correct. Disconnect the exciter from the FL-110. Set PTT switch to (-) position. Connect PTT terminal (gin 4) to ground. Turn the power switch "ON". Adjust VR1201 for 100mA idle current. Remove the ammeter from the circuit and recover the wring cut for the ammeter Intallition.









BOOSTER UNIT PR. 14448

LPF UNIT (PG-1527)



PARTS LIST

	MAIN CH	ASSIS	1219	524.6	470.12
0	DIODE				
1	84	10D1(3N4002)	T	TRANSFORMER	
			1202	INPUT	
C	CAPACITOR		1293	OUTPUT	= 220020
	CERAMIC	DISC			
1 2	3. 4 59%	V 0.047Y	L	INDUCTOR	
			1200	RF CHOKE	= 220034
D1			1292		5 120041
	RELAY			RF CHOKE	# 2203325
	AP3241	HC4 DC12V	1203.		
RUS	RELAY SOCRET				
1	AP284455	HC4-SS			
5	SWITCH				
		W12-9216.		COUPLER UN	
	POWER			PRINTED CIRCUIT BO	
	DELAY	WD 9216	PB.		
	BAND	2-2-4 CM055 CM058		(A-Z)	
4	PTT	55 F 22 68			
-			0	DIODE 105 Ge(GB)	
J.	RECEPTACLE		1021-0	101 Gr(GB)	15(1007/1N2/0)
1	ARGE-TAGLE	100.0	101-	Jacob.	Cartary Cartary
	ANT	150-219		RESISTOR	
	INPUT	JSO 219	14	REGIOINA	
3	POWER	QMS-AB6M		CARBON FILM	
			302	04 1/W	52 0
_			105.7	64 3/W	47012
			191	3cw	NEK O
			VB	POTENTIOMETER	
					50N C E
	BOOSTE		105	EVL VOAA 60B51	
PR	PRINTED CIRCUI				
			0	CAPACITOR	
				DIPPED MICA	
9	TRANSISTOR		100.1	07 SRWY	180 PP
	1212 SHF				
	1242 SRF			CERAMIC DISC	
1203		113E/280235		DER SHAV	0.0107
				188 56WV	
D	CHODE				
2201	1392 51	10/010	TC	TRIMMER CAPACITO	
			101	ECV-12W (0>:40	10PF
11	RESISTOR				
	PLUIDIN COM	TRUE TRUE	1.7	TRANSFORMER	
	CARBON COM	POSITION			N 2245077
3207	CARBON COM	3.20	T 101	CN COUPLER	s 22002
1203	CARBON COM	3.30			8 22402
	CARBON COM	3.20			S 22002
1203	CARBON COM	3.30 150 8892			s 220023
1203	CARBON COM	3.30 150 8892			s 224077
150.0	CARBON COM	3.30 150 6882			s 22007
1203	CARBON COM 1865 5.W 1865	3.30 150 8882 M		CN COUPLER	
1203 1209 1209	CARBON COM 54W 1205 54W 54W METALIC FH 1209 14W 34W	3.30 150 8892 M 380 380	101	CN COUPLER	at
1203 1209 1209 1204 1208 1208	CARBON COM 1205 55W 1205 55W 55W METALIC FIL 1209 1W 3W 3W	3.30 150 88802 M 390 350 550 540	101	CN COUPLER	at
1203 1209 1204 1204 1202 1202	CARBON COM 34W 1265 54W 54W METALIC FIL 1209 1W 3W 3W 3W 3W	3,30 150 8892 M 390 350 350 480	101	CN COUPLER	at
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1203 1204 1204 1208 1202 1211 1201 1210 1210 VR 1201	CARBON COM 1805 54W 1905 54W METALIC FIL 1209 10W 30W 30W 30W 20W 20W 20W 20W 20W 20W 20W 2	3.30 150 8892 M 330 520 480 330 330 330 330 330 330 330 330 330 3	101 PB 1681 Q 204	CN COUPLER PRINTED CRCUIT DI A-ZI IC, TRANSISTOR & T	HYRSTOR MYRSTOR MC 2710 25C 3279 25C 7231
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	34W	SORO	L P		
293,204	W	2608.0	301,220	160m LOWPASS	≤ 220148A
CARD	ION COMPOS	TITION	305,204		= 220247A
207	34 W	22.2	305.305	40m LOWPASS	= 226214
			307	20m LOWPASS(A)	≠ 220254
	OMETER		206	20m LOWPASS(B)	
202.203 E	VL VOAA	00B54 50K2B	-309	15m LOWPASS(A)	\$1221216
251 17	VL-VOAA	00R36 234 0 R	310	15m LOWPASS(B)	5 220217
			311.312	10m LOWPASS	E 226218
C CAPACIT					
CERA	MIC DISC				_
202~207,209,210	0 SOWV	0.01,.01			
1100	ALUM				
208	16WV	0.22vF	-	LED BOARD	and the second se
201	26WV	0.115P	PB P	RINTED CIRCUIT BOAR	20
	NOW Y	107	15084	RECOPER INDICAT	OR
RL RELAY			1579	AFP INDICATOR	
201	G20C			The subscripts	
			PL	ED	
			401	SG-103D	
			\$02.501	SR-103D	
			R R	ESISTOR	
ALC: NOT THE OWNER	LPF UNIT	And the second second second		CARBON FILM	
PB PRINTER	CIRCUIT D	DARD	400	34W	330.2
157718				and the second se	-
and the second of the			c c	PACITOR	
D DIODE				CERAMIC DISC	
301~305	Ge(GB)	151007(13270)	401	50W V.	0.047.0F
			_	ACCESSORIES	
R RESISTO	ON FILM		COAXIAL		100
CARE	SW PILM			ER CORD #240026	2
302 303, 504	NW N	8212 4760	DU POW	POWER PLUG QMS-6	FF (U
303, 304	3GW	1060	_	FUSE HOLDER SN-11	PA (1)
391	24W	198.9	-	FUSE HOLDER SATI	12 (1)
VP POTENT	OMETER		DISE	PUSE JIA 30A	1
				-80	
	VL-VOAA	BIRS4 SOKOB			
C CAPACIT	TOR	01804 994.018			
C CAPACIT	ED MICA				
C CAPACIT DIPP	ED MICA	INTE			
C CAPACIT DIPP 301, 302 325	ED MICA SOWV	180PF 82PF			
C CAPACIT DIPP 301, 302 325 327	ED MICA ED MICA 500WV 500WV	160PF 82FF 100PF			
C CAPACIT DIPP 301, 302 325 327 324	ED MICA SOWV SOWV SOWV SOWV	166PF 62PF 101PF 100PF(56PF×2)			
C CAPACIT DIPPI 301,302 325 327 324 332	ED MICA SOWV SOWV SOWV SOWV SOWV	180PF 82PF 100FF 100FF(22PF×2) 120FF			
C CAPACIT DIPP 381, 302 325 327 324 322 322 324 322 326	ED MICA SOWV SCOWV SCOWV SCOWV SCOWV	18079 8279 10075 10075(2279×2) 10075(2279×2) 10075(2279) 10075(2279)			
C CAPACIT DIFP 361,302 315 325 324 324 324 322 326 323	TOR ED MICA SOWV SOWV SOWV SOWV SOWV SOWV	180PF 82PF 100PF 100PF(32PF×2) 130PF(82PF×2) 130PF(82PF×2) 130PF(82PF×2)			
C CAPACIT DIFF 381,302 323 327 324 332 322 322 322 323 323 323 321	TOR ED MICA 560WV 560WV 560WV 560WV 560WV 560WV	18679 8277 10077 10077(2075×1) 12077(8075×1) 13077(6875×2) 10077(8075×2)		•	
C CAPACIT DIFFI 341, 202 327 327 324 322 325 325 325 325 325 325 325 325 325	TOR ED MICA Stowy Stowy Stowy Stowy Stowy Stowy Stowy Stowy Stowy Stowy	1807F 827F 1007F 2007F 1107F (807F×2) 1107F (807F×2) 1107F (827F×2) 1707F (827F×2) 2707F		•	
C CAPACI DIPP 301, 302 325 327 324 324 322 325 323 323 323 321 319 318, 300	TOR ED MICA 3000V 3000V 3000V 3000V 3000V 3000V 3000V 3000V 5000V 5000V	18019 8219 10019 110595(2019×2) 12059 130595(6019×2) 130595(62295×2) 170595(62295×2) 270575 500195			
C CAPACIT DIPPI 301, 302 325 327 324 328 328 328 328 321 321 321 329 318, 301 318	TOR ED MICA 500 V 500 V 500 V 500 V 500 V 500 V 500 V 500 V 500 V 500 V	180PF 100PF 100PF 100PF(20PF×1) 100PF(60PF×1) 100PF(62PF×2) 100PF(52PF×2) 100PF(52PF×2) 100PF 100P			
C CAPACIT DIPPI 323 327 327 328 327 328 327 328 328 328 321 321 321 321 321 321 321 321 321 321	TOR ED NICA 300 V 300 V 300 V 300 V 300 V 300 V 300 V 300 V 500 V 500 V 500 V 500 V 500 V 500 V 500 V 500 V	150197 82787 100197 110977(52075×21) 110977(52075×21) 110977(52075×21) 110977(52075×21) 110977(52075×21) 500197 500197(520797×21)			
C CAPACIT DIPPI 301, 302 325 327 324 326 328 328 321 321 319 319 318 319 319 315 319 315 319 315 315 315 315 315 315 315 315 315 315	TOR ED MICA 300 V 300 V 300V 300	18077 1077			
C CAPACIT DIPPI 381,302 325 327 326 328 328 328 328 321 321 321 321 321 321 321 321 321 321	ED MICA 80W V 300W V	160 PF 82 PF 100 PF 110 PF (20 PF × 1) 110 PF (20 PF × 2) 110 PF (20 PF × 2) 110 PF (20 PF × 2) 20 PF 50 PF (20 PF × 2) 50 PF 50 PF (20 PF × 2) 60 PF			
C CAPACIT DUPPI 301,302 325 327 327 324 322 326 323 321 329 318,300 318 317 313 313 313 313 313 313 313 313 314	TOR ED MICA 300 V 300 V 300 V 300 V 300 V 300 V 300 V 300 V 500 V	188797 18797 18797 180577 189577 199577			
C CAPACIT DIPPI 381,302 325 327 326 328 328 328 328 321 321 321 321 321 321 321 321 321 321	ED MICA 80W V 300W V	160 PF 82 PF 100 PF 110 PF (20 PF × 1) 110 PF (20 PF × 2) 110 PF (20 PF × 2) 110 PF (20 PF × 2) 20 PF 50 PF (20 PF × 2) 50 PF 50 PF (20 PF × 2) 60 PF			
C GAPACI DIPPI 301, 302 302 302 302 302 302 302 302 302 302	ED MICA 200 V 300 V	188797 18797 18797 180577 189577 199577			
C GAPACI DIPP 381, 802 372 372 374 374 374 375 374 375 374 375 375 375 375 375 375 375 375 375 375	TOR ED MICA 300 V 300 V 300 V 300 V 300 V 300 V 300 V 300 V 500 V	1403PF 427P 427P 100			
C GAPACI DIPPI 301, 303 302 302 302 302 302 302 302 302 302	TOR ED.NICA 300W V 300W V	188797 18797 18797 180577 189577 199577			
C GAPACT DUPP 311, 200 323 323 324 324 325 326 326 326 327 326 327 326 327 328 328 329 329 329 329 329 329 329 329 329 329	TOR ED NICA 300 V 300 V 30	1401FF 427F 1007F 1107F(32PF x 1) 1201F 1300FF x 1) 1300FF x 1 1300FF x 1 2007F 3001FF 3001FF 3001FF 3001FF 3001FF 3001FF 2000FF 2000FF 2000FF 2000FF 2000FF			
C GAPACT DIPP 301, 302 323 324 325 325 326 326 328 328 328 329 329 329 329 329 329 329 329	TOR ED NICA 300 V 300 V 30	1401FF 427F 1007F 1107F(32PF x 1) 1201F 1300FF x 1) 1300FF x 1 1300FF x 1 2007F 3001FF 3001FF 3001FF 3001FF 3001FF 3001FF 2000FF 2000FF 2000FF 2000FF 2000FF			
C GAPACT 317, 2017 327 327 327 327 327 328 329 324 324 325 325 325 326 327 327 327 327 328 329 329 329 329 329 329 329 329	500 ED NICA 300WV 500WV	161PF 1077			
C CAPACT 301, 302, 302 327 327 327 327 327 327 327 32	COR ED NICA 300WV	1401PF 1277			
C CAPACT 301, 302, 302 327 327 327 327 327 327 327 32	500 ED NICA 300WV 500WV	1401PF 1277		*	
C CAPACT 301, 201791 322 322 323 324 325 325 325 326 327 327 328 329 329 329 329 329 329 329 329	THE MICS SOW V SOW V	1401PF 1277			
C CAPACT 301, 802 327 327 327 327 328 329 329 329 329 329 329 329 329	THE MICS SOW V SOW V	148797 12797 12797 12877 12877 12877 12877 12977 1			

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